

## **Support Document 16**

### **MSDSs for Chemicals Used in the Reformulation of Liquid Wrench**

SIGMA-ALDRICH									
<b>Material Safety Data Sheet</b> Version 3.2 Revision Date 03/25/2009 Print Date 05/19/2009									
<b>1. PRODUCT AND COMPANY IDENTIFICATION</b> Product name : Benzene Product Number : 270709 Brand : Sigma-Aldrich Company : Sigma-Aldrich 3650 Spruce Street SAINT LOUIS MO 63103 USA Telephone : +1 800-325-5832 Fax : +1 800-325-5052 Emergency Phone # : (314) 778-8555									
<b>2. COMPOSITION/INFORMATION ON INGREDIENTS</b> Formula : $C_6H_6$ Molecular Weight : 78.11 g/mol <table border="1"> <thead> <tr> <th>CAS No.</th> <th>EC No.</th> <th>Index No.</th> <th>Concentration</th> </tr> </thead> <tbody> <tr> <td>Benzene 71-43-2</td> <td>200-753-7</td> <td>601-020-00-8</td> <td>-</td> </tr> </tbody> </table>		CAS No.	EC No.	Index No.	Concentration	Benzene 71-43-2	200-753-7	601-020-00-8	-
CAS No.	EC No.	Index No.	Concentration						
Benzene 71-43-2	200-753-7	601-020-00-8	-						
<b>3. HAZARDS IDENTIFICATION</b> <b>Emergency Overview</b> OSHA Hazards Flammable Liquid, Target Organ Effect, Irritant, Carcinogen, Mutagen <b>Target Organs</b> Blood, Eyes, Female reproductive system, Bone marrow <b>HMIS Classification</b> Health Hazard: 2 Chronic Health Hazard: 3 Flammability: 0 Physical Hazards: 0 <b>NFPA Rating</b> Health Hazard: 2 Fire: 3 Reactivity Hazard: 0 <b>Potential Health Effects</b> Inhalation: May be harmful if inhaled. Causes respiratory tract irritation. Skin: May be harmful if absorbed through skin. Causes skin irritation.									
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<b>Eyes</b> Causes eye irritation. <b>Ingestion</b> Aspiration hazard if swallowed - can enter lungs and cause damage. May be harmful if swallowed.	<b>4. FIRST AID MEASURES</b> <b>General advice</b> Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area. <b>If inhaled</b> If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician. <b>In case of skin contact</b> Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician. <b>In case of eye contact</b> Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. <b>If swallowed</b> Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
<b>5. FIRE-FIGHTING MEASURES</b> <b>Flammable properties</b> Flash point -11.0 °C (12.2 °F) - closed cup Ignition temperature 582 °C (1,044 °F) <b>Suitable extinguishing media</b> For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. <b>Specific hazards</b> Flash back possible over considerable distance. Container explosion may occur under the conditions. <b>Special protective equipment for fire-fighters</b> Wear self contained breathing apparatus for fire fighting if necessary. <b>Further information</b> Use water spray to cool unopened containers.	<b>6. ACCIDENTAL RELEASE MEASURES</b> <b>Personal precautions</b> Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. <b>Environmental precautions</b> Prevent further leakage or spillage if safe to do so. Do not let product enter drains. <b>Methods for cleaning up</b> Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).
<b>7. HANDLING AND STORAGE</b> <b>Handling</b> Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.	Sigma-Aldrich - 270709 Delivery 062279941-000010 Purchase Order CCEVAPOPORATION STUDY Sigma-Aldrich Corporation www.sigma-aldrich.com Page 2 of 8

**Storage**  
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully  
resealed and kept upright to prevent leakage. Store in cool place.

#### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

##### Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis
Benzene	71-43-2	TWA	0.5 ppm	2007-01-01	USA, ACGIH Threshold Limit Values (TLV)
Remarks	Leukemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen. The agent is carcinogenic to humans based on the weight of evidence from epidemiologic studies. Danger of cutaneous absorption				
		STEL	2.5 ppm	2007-01-01	USA, ACGIH Threshold Limit Values (TLV)
	Leukemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen. The agent is carcinogenic to humans based on the weight of evidence from epidemiologic studies. Danger of cutaneous absorption				
		TWA	1 ppm	1989-03-01	USA, OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
Sec. 1910.1028 Benzene. The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table Z-2 apply. See Table Z-2 for the limits applicable in the operations or sectors excluded in 1910.1028.					
		STEL	5 ppm	1989-03-01	USA, OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
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		TWA	1 ppm	1983-06-30	USA, Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

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	STEL	5 ppm	1993-06-30	USA, Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	TWA	10 ppm	2007-01-01	USA, Occupational Exposure Limits (OSHA) - Table Z2
237.40-1969				
	CEIL	25 ppm	2007-01-01	USA, Occupational Exposure Limits (OSHA) - Table Z2
237.40-1969				
	Peak	50 ppm	2007-01-01	USA, Occupational Exposure Limits (OSHA) - Table Z2
237.40-1969				
See 1910.1028. See Table Z-2 for the limits applicable in the operations or sectors excluded in 1910.1028. The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table Z-2 apply.				

##### Personal protective equipment

**Respiratory protection**  
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**  
Handle with gloves.

**Eye protection**  
Safety glasses

**Skin and body protection**  
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

**Hygiene measures**  
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

#### 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**  
Form liquid  
Colour colourless

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<p><b>Safety data</b></p> <p>pH no data available</p> <p>Melting point 5.5 °C (41.9 °F)</p> <p>Boiling point 80 °C (176 °F)</p> <p>Flash point -11.0 °C (12.2 °F) - closed cup</p> <p>Ignition temperature 592 °C (1,044 °F)</p> <p>Lower explosion limit 1.3 % (V)</p> <p>Upper explosion limit 8 % (V)</p> <p>Vapour pressure 221.3 hPa (166.0 mmHg) at 37.7 °C (99.9 °F) 99.5 hPa (74.6 mmHg) at 20.0 °C (68.0 °F)</p> <p>Density 0.874 g/mL at 25 °C (77 °F)</p> <p>Water solubility no data available</p>	<p><b>10. STABILITY AND REACTIVITY</b></p> <p><b>Storage stability</b> Stable under recommended storage conditions.</p> <p><b>Conditions to avoid</b> Heat, flames and sparks.</p> <p><b>Materials to avoid</b> acids, bases, halogens, strong oxidizing agents, metallic salts</p> <p><b>Hazardous decomposition products</b> Hazardous decomposition products formed under fire conditions. - Carbon oxides</p> <p><b>Hazardous reactions</b> Vapours may form explosive mixture with air.</p>	<p><b>11. TOXICOLOGICAL INFORMATION</b></p> <p><b>Acute toxicity</b></p> <p>LD50 Oral - rat - 2,990 mg/kg</p> <p>LC50 Inhalation - rat - female - 4 h - 44,700 mg/m3</p> <p>LD50 Dermal - rabbit - 8,263 mg/kg</p> <p><b>Irritation and corrosion</b></p> <p>Skin - rabbit - Skin irritation</p> <p>Eyes - rabbit - Eye irritation</p> <p><b>Sensitisation</b> no data available</p> <p><b>Chronic exposure</b></p> <p>Carcinogenicity - Human - male - Inhalation Tumorigenic: Carcinogenic by RTECS criteria. Leukaemia Blood: Thrombocytopenia.</p> <p>Carcinogenicity - rat - Oral Tumorigenic: Carcinogenic by RTECS criteria. Endocrine: Tumors. Leukaemia</p>
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<p>This is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.</p> <p><b>IARC:</b> 1 - Group 1: Carcinogenic to humans (Benzene)</p> <p><b>NTP:</b> Known to be human carcinogen (Benzene)</p> <p>Genotoxicity in vitro - Human - lymphocyte Sister chromatid exchange</p> <p>Genotoxicity in vitro - mouse - lymphocyte Mutation in mammalian somatic cells.</p> <p>Genotoxicity in vivo - mouse - Inhalation Sister chromatid exchange</p> <p>Laboratory experiments have shown mutagenic effects.</p> <p>Developmental Toxicity - rat - Inhalation Effects on Embryo or Fetus: Extra embryonic structures (e.g., placenta, umbilical cord). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).</p> <p>Developmental Toxicity - mouse - Inhalation Effects on Embryo or Fetus: Cytological changes (including somatic cell genetic material). Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).</p> <p>Reproductive toxicity - mouse - Intrapertoneal Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Embryo or Fetus: Fetal death.</p>	<p><b>Signs and Symptoms of Exposure</b></p> <p>Nausea, Dizziness, Headache, tinnitus, Inhalation of high concentrations of benzene may have an initial stimulatory effect on the central nervous system characterized by exhilaration, nervous excitation and/or dizziness, depression, tiredness, or fatigue. The victim may experience tightness in the chest, breathlessness, and loss of consciousness. Tremors, convulsions, and death due to respiratory paralysis or circulatory collapse can occur in a few minutes to several hours following severe exposures. Aspiration of small amounts of liquid immediately causes pulmonary edema and hemorrhage of pulmonary tissue. Direct skin contact may cause erythema. Repeated or prolonged skin contact may result in drying, scaling dermatitis, or development of secondary skin infections. The chief target organ is the hematopoietic system. Bleeding from the nose, gums, or mucous membranes and the development of purpura spots, petechiae, leukopenia, thrombocytopenia, aplastic anemia, and leukemia may occur as the condition progresses. The bone marrow may appear normal, aplastic or hyperplastic, and may not correlate with peripheral blood-forming tissues. The onset of effects of prolonged benzene exposure may be delayed for many months or years after the actual exposure has ceased. Blood disorders</p> <p><b>Potential Health Effects</b></p> <p>Inhalation May be harmful if inhaled. Causes respiratory tract irritation. Skin May be harmful if absorbed through skin. Causes skin irritation. Eyes Causes eye irritation. Ingestion Aspiration hazard if swallowed - can enter lungs and cause damage. May be harmful if swallowed. Target Organs Blood, Eyes, Female reproductive system., Bone marrow,</p> <p><b>Additional Information</b> RTECS: CY1400000</p>	<p><b>12. ECOLOGICAL INFORMATION</b></p> <p><b>Elimination information (persistence and degradability)</b></p> <p>Biodegradability Result: - Readily biodegradable.</p>
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<p><b>Bioaccumulation</b></p> <p>Laudiscus latus (Golden orfe) - 3 d Bioconcentration factor (BCF): 10</p> <p><b>Ecotoxicity effects</b></p> <p><b>Toxicity to fish</b></p> <p>LC50 - Oncorhynchus mykiss (rainbow trout) - 5.90 mg/l - 96 h LC50 - Pimephales promelas (fathead minnow) - 15.00 - 32.00 mg/l - 96 h LC50 - Lepomis macrochirus (Bluegill) - 230.00 mg/l - 96 h NOEC - Pimephales promelas (fathead minnow) - 10.2 mg/l - 7 d LOEC - Pimephales promelas (fathead minnow) - 17.2 mg/l - 7 d EC50 - Daphnia magna (Water flea) - 22.00 mg/l - 48 h</p> <p><b>Toxicity to daphnia and other aquatic invertebrates.</b></p> <p>EC50 - Daphnia magna (Water flea) - 9.20 mg/l - 48 h EC50 - Pseudokirchneriella subcapitata (green algae) - 29.00 mg/l - 72 h</p> <p><b>Toxicity to algae</b></p> <p><b>Further information on ecology</b> no data available</p>	<p><b>13. DISPOSAL CONSIDERATIONS</b></p> <p><b>Product</b> Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.</p> <p><b>Contaminated packaging</b> Dispose of as unused product.</p>	<p><b>14. TRANSPORT INFORMATION</b></p> <p><b>DOT (US)</b> UN-Number: 1114 Class: 3 Proper shipping name: Benzene Marine pollutant: No Poison Inhalation Hazard: No</p> <p><b>IMDG</b> UN-Number: 1114 Class: 3 Proper shipping name: BENZENE Marine pollutant: No</p> <p><b>IATA</b> UN-Number: 1114 Class: 3 Proper shipping name: Benzene</p> <p>Packing group: II Packing group: II Packing group: II</p> <p>EMS-No: F-E, S-D</p>	<p><b>15. REGULATORY INFORMATION</b></p> <p><b>OSHA Hazards</b> Flammable Liquid, Target Organ Effect, Irritant, Carcinogen, Mutagen</p> <p><b>DSL Status</b> All components of this product are on the Canadian DSL list.</p>	<p>Sigma-Aldrich - 270709 Delivery 8632278941-000010 Purchase Order CODEVAPORATION STUDY</p> <p>Page 7 of 8</p>
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<p><b>SARA 302 Components</b> SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.</p> <p><b>SARA 313 Components</b></p> <p>Benzene</p> <p>CAS-No. 71-43-2 Revision Date 2007-07-01</p>	<p><b>SARA 311/312 Hazards</b> Fire Hazard, Acute Health Hazard, Chronic Health Hazard Massachusetts Right To Know Components</p> <p>Benzene</p> <p>CAS-No. 71-43-2 Revision Date 2007-07-01</p>	<p><b>Pennsylvania Right To Know Components</b></p> <p>Benzene</p> <p>CAS-No. 71-43-2 Revision Date 2007-07-01</p>	<p><b>New Jersey Right To Know Components</b></p> <p>Benzene</p> <p>CAS-No. 71-43-2 Revision Date 2007-07-01</p>	<p><b>California Prop. 65 Components</b> WARNING! This product contains a chemical known in the State of California to cause cancer.</p> <p>Benzene</p> <p>CAS-No. 71-43-2 Revision Date 2004-05-12</p>	<p><b>California Prop. 65 Components</b> WARNING! This product contains a chemical known in the State of California to cause birth defects or other reproductive harm.</p> <p>Benzene</p> <p>CAS-No. 71-43-2 Revision Date 2004-05-12</p>	<p>Sigma-Aldrich - 270709 Delivery 8632278941-000010 Purchase Order CODEVAPORATION STUDY</p> <p>Page 8 of 8</p>
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## 16. OTHER INFORMATION

## Further Information

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EPI00162

## SIGMA-ALDRICH

## MATERIAL SAFETY DATA SHEET

Date Printed: 03/18/2005

Date Updated: 07/01/2004

Version 1.5

## Section 1 - Product and Company Information

Product Name	CYCLOHEXANE, REAGENTPLUS, >=99%
Product Number	C100307
Brand	ALDRICH
Company	Sigma-Aldrich
Street Address	3050 Spruce Street
City, State, Zip, Country	SAINT LOUIS MO 63103 US
Technical Phone:	314 771 5765
Emergency Phone:	414 273 3850 Ext. 5996
Fax:	800 325 5052

## Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
CYCLOHEXANE	110-82-7	Yes
Formula	C6H12	
Synonyms	Benzene, hexahydro- * Cicloesano (Italian) * Cyclohexaan (Dutch) * Cyclohexan (German) * Cyclohexane (ACGIH:OSHA) * Cykloheksan (Polish) * Hexahydrobenzene * Hexamethylene * Hexanaphthene * RCRA waste number U056	
RTECS Number:	GU6300000	

## Section 3 - Hazards Identification

## EMERGENCY OVERVIEW

Flammable (USA) Highly Flammable (EU). Harmful. Dangerous for the environment.

Irritating to skin. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness.

Target organ(s): Lungs. Central nervous system.

## HMIS RATING

HEALTH: 2\*

FLAMMABILITY: 3

REACTIVITY: 0

## NFPA RATING

HEALTH: 2

FLAMMABILITY: 3

REACTIVITY: 0

\*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

## Section 4 - First Aid Measures



ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician. Do not induce vomiting.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE

In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE

In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

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Section 5 - Fire Fighting Measures

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FLAMMABLE HAZARDS

Flammable Hazards: Yes

EXPLOSION HAZARDS

Vapor may travel considerable distance to source of ignition and flash back. Container explosion can occur under fire conditions. In advanced or massive fires the area should be evacuated and the fire should be fought from a remote explosion-resistant location.

FLASH POINT

-0.4 °F -18 °C Method: closed cup

EXPLOSION LIMITS

Lower: 1 % Upper: 9 %

AUTOIGNITION TEMP

260 °C.

FLAMMABILITY

N/A

EXTINGUISHING MEDIA

Suitable: Carbon dioxide, dry chemical powder, or appropriate foam.

Unsuitable: Water may be effective for cooling, but may not effect extinguishment.

FIREFIGHTING

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Flammable liquid. Emits toxic fumes under fire conditions.

Specific Method(s) of Fire Fighting: Use water spray to cool fire-exposed containers.

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Section 6 - Accidental Release Measures

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PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area. Shut off all sources of ignition.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)

EPI00164

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

#### METHODS FOR CLEANING UP

Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

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### Section 7 - Handling and Storage

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#### HANDLING

User Exposure: Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

#### STORAGE

Suitable: Keep container closed. Keep away from heat, sparks, and open flame. Store in a cool dry place. Store under nitrogen.

#### SPECIAL REQUIREMENTS

Store under inert gas.

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### Section 8 - Exposure Controls / PPE

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#### ENGINEERING CONTROLS

Safety shower and eye bath. Use nonsparking tools. Mechanical exhaust required.

#### PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Government approved respirator.  
Hand: Compatible chemical-resistant gloves.  
Eye: Chemical safety goggles.

#### GENERAL HYGIENE MEASURES

Wash thoroughly after handling. Wash contaminated clothing before reuse.

#### EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	300 PPM
USA	MSHA Standard-air	TWA	300 PPM (1050 MG/M3)
USA	OSHA.	PEL	8H TWA 300 PPM (1050 MG/M3)
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	300 PPM

#### EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	300 MG/M3
Poland		NDSch	1000 MG/M3
Poland		NDSP	-

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### Section 9 - Physical/Chemical Properties

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Appearance	Physical State: Liquid Color: Colorless		
Property	Value	At Temperature or Pressure	
Molecular Weight	84.16 AMU		
pH	N/A		
BP/BP Range	80.7 °C	760 mmHg	EPI00165



MP/MP Range	6.5 °C	
Freezing Point	N/A	
Vapor Pressure	77 mmHg	20 °C
Vapor Density	2.9 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	0.778 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	-0.4 °F -18 °C	Method: closed cup
Explosion Limits	Lower: 1 %	
	Upper: 9 %	
Flammability	N/A	
Autoignition Temp	260 °C	
Refractive Index	1.426	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

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#### Section 10 - Stability and Reactivity

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##### STABILITY

Stable: Stable.

Materials to Avoid: Strong oxidizing agents.

##### HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

##### HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

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#### Section 11 - Toxicological Information

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##### ROUTE OF EXPOSURE

Skin Contact: Causes skin irritation.

Skin Absorption: May be harmful if absorbed through the skin.

Eye Contact: May cause eye irritation.

Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.

Ingestion: May be harmful if swallowed.

##### TARGET ORGAN(S) OR SYSTEM(S)

Lungs. Central nervous system.

##### SIGNS AND SYMPTOMS OF EXPOSURE

Exposure can cause CNS depression, drowsiness, light-headedness, and irritability. Damage to the lungs. Gastrointestinal disturbances. Lung irritation, chest pain, and edema which may be fatal.

##### TOXICITY DATA

EPI00166

Oral  
Rat  
12705 mg/kg  
LD50

Oral  
Mouse  
813 mg/kg  
LD50

Inhalation  
Mammal  
70,000 mg/m3  
LC50

#### IRRITATION DATA

Skin  
Rabbit  
1,548 mg  
2D  
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#### Section 12 - Ecological Information

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No data available.

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#### Section 13 - Disposal Considerations

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##### APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

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#### Section 14 - Transport Information

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##### DOT

Proper Shipping Name: Cyclohexane  
UN#: 1145  
Class: 3  
Packing Group: Packing Group II  
Hazard Label: Flammable liquid  
PIH: Not PIH

##### IATA

Proper Shipping Name: Cyclohexane  
IATA UN Number: 1145  
Hazard Class: 3  
Packing Group: II

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#### Section 15 - Regulatory Information

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##### EU DIRECTIVES CLASSIFICATION

Symbol of Danger: F Xn N  
Indication of Danger: Highly Flammable. Harmful. Dangerous for the environment.  
R: 11 38 50/53 65 67  
Risk Statements: Highly flammable. Irritating to skin. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Harmful: may cause lung damage if

swallowed. Vapors may cause drowsiness and dizziness.

S: 9 16 33 60 61 62

Safety Statements: Keep container in a well-ventilated place. Keep away from sources of ignition - no smoking. Take precautionary measures against static discharges. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

#### US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Flammable (USA) Highly Flammable (EU).

Harmful. Dangerous for the environment.

Risk Statements: Irritating to skin. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness.

Safety Statements: Keep container in a well-ventilated place. Keep away from sources of ignition - no smoking. Take precautionary measures against static discharges. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

US Statements: Target organ(s): Lungs. Central nervous system.

#### UNITED STATES REGULATORY INFORMATION

SARA LISTED: Yes

DEMINIMIS: 1 %

NOTES: This product is subject to SARA section 313 reporting requirements.

TSCA INVENTORY ITEM: Yes

#### CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes

NDSL: No

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#### Section 16 - Other Information

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#### DISCLAIMER

For R&D use only. Not for drug, household or other uses.

#### WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2005 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.

**SIGMA-ALDRICH****Material Safety Data Sheet**Version 3.0  
Revision Date 12/27/2008  
Print Date 05/22/2009**1. PRODUCT AND COMPANY IDENTIFICATION**

Product name : Ethylbenzene

Product Number : E12508

Brand : Sigma-Aldrich

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

Emergency Phone # : (314) 776-6555

**2. COMPOSITION/INFORMATION ON INGREDIENTS**

Formula : C<sub>8</sub>H<sub>10</sub>

Molecular Weight : 106.17 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Ethylbenzene</b>			
100-41-4	202-849-4	601-023-00-4	-

**3. HAZARDS IDENTIFICATION****Emergency Overview****OSHA Hazards**

Flammable Liquid, Irritant, Carcinogen

**Target Organs**

Central nervous system, Blood

**HMIS Classification**

Health Hazard: 2

Chronic Health Hazard: \*

Flammability: 3

Physical hazards: 0

**NFPA Rating**

Health Hazard: 3

Fire: 3

Reactivity Hazard: 0

**Potential Health Effects**

**Inhalation** May be harmful if inhaled. Causes respiratory tract irritation.

**Skin** May be harmful if absorbed through skin. Causes skin irritation.

**Eyes**  
**Ingestion**

Causes eye irritation.  
May be harmful if swallowed.

#### 4. FIRST AID MEASURES

**General advice**

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**

If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

**In case of skin contact**

Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

#### 5. FIRE-FIGHTING MEASURES

**Flammable properties**

Flash point 15.0 °C (59.0 °F) - closed cup

Ignition temperature 432 °C (810 °F)

**Suitable extinguishing media**

For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

**Special protective equipment for fire-fighters**

Wear self contained breathing apparatus for fire fighting if necessary.

**Further information**

Use water spray to cool unopened containers.

#### 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

**Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

**Methods for cleaning up**

Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

#### 7. HANDLING AND STORAGE

**Handling**

Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

**Storage**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.

hygroscopic

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Components with workplace control parameters**

Components	CAS No	Value	Control parameters	Update	Basis
Ethylbenzene	100-41-4	TWA	100 ppm	2002-01-01	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004; Committees on Threshold Limit Values (TLVs ) and Biological Exposure Indices (BEIs)
Remarks	Confirmed animal carcinogen with unknown relevance to humans. Substances for which there is a Biological Exposure Index or Indices. 2002 Adoption.				
		STEL	125 ppm	2002-01-01	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004; Committees on Threshold Limit Values (TLVs ) and Biological Exposure Indices (BEIs)
	Confirmed animal carcinogen with unknown relevance to humans. Substances for which there is a Biological Exposure Index or Indices. 2002 Adoption.				
		TWA	100 ppm 435 mg/m3	1989-03-01	US. Department of Labor - Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1000 Z-1-A
		STEL	125 ppm 545 mg/m3	1989-03-01	US. Department of Labor - Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1000 Z-1-A
		TWA	100 ppm 435 mg/m3	1993-06-30	US. Department of Labor - Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL) 29 CFR 1910.1000 Air Contaminants.



**Personal protective equipment****Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**

Handle with gloves.

**Eye protection**

Safety glasses

**Skin and body protection**

Choose body protection according to the amount and concentration of the dangerous substance at the work place.

**Hygiene measures**

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**9. PHYSICAL AND CHEMICAL PROPERTIES****Appearance**

Form	liquid
Colour	colourless

**Safety data**

pH	no data available
Melting point	-95.0 °C (-139.0 °F)
Boiling point	136.0 - 137.0 °C (276.8 - 278.6 °F)
Flash point	15.0 °C (59.0 °F) - closed cup
Ignition temperature	432 °C (810 °F)
Lower explosion limit	1 %(V)
Upper explosion limit	6.7 %(V)
Vapour pressure	25.3 hPa (19.0 mmHg) at 37.7 °C (99.9 °F) 13.3 hPa (10.0 mmHg) at 20.0 °C (68.0 °F)
Density	0.87 g/cm <sup>3</sup>
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 2.92

**10. STABILITY AND REACTIVITY****Storage stability**

Stable under recommended storage conditions.

**Conditions to avoid**

Heat, flames and sparks.

**Materials to avoid**

Strong oxidizing agents

**Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides

**Hazardous reactions**

Vapours may form explosive mixture with air.

**11. TOXICOLOGICAL INFORMATION****Acute toxicity**

LD50 Dermal - rabbit - 15,433 mg/kg

**Irritation and corrosion**

Eyes - rabbit - Risk of serious damage to eyes.

**Sensitisation**

no data available

**Chronic exposure**

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

IARC: Group 2B - Possibly carcinogenic to humans (Ethylbenzene)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Signs and Symptoms of Exposure**

Central nervous system depression, Nausea, Headache, Vomiting, Ataxia., Tremors

**Potential Health Effects**

<b>Inhalation</b>	May be harmful if inhaled. Causes respiratory tract irritation.
<b>Skin</b>	May be harmful if absorbed through skin. Causes skin irritation.
<b>Eyes</b>	Causes eye irritation.
<b>Ingestion</b>	May be harmful if swallowed.
<b>Target Organs</b>	Central nervous system, Blood,

**Additional Information**

RTECS: DA0700000

**12. ECOLOGICAL INFORMATION****Elimination information (persistence and degradability)**

no data available

**Ecotoxicity effects**

Toxicity to fish	LC50 - Cyprinodon variegatus (sheepshead minnow) - 88.00 mg/l - 96 h
	LC50 - Lepomis macrochirus (Bluegill) - 80.00 mg/l - 96 h
	NOEC - Cyprinodon variegatus (sheepshead minnow) - 88 mg/l - 96 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 4.2 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates. EC50 - Daphnia magna (Water flea) - 2.90 mg/l - 48 h

**Further information on ecology**

no data available

**13. DISPOSAL CONSIDERATIONS**

**Product**

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**

Dispose of as unused product.

**14. TRANSPORT INFORMATION**

**DOT (US)**

UN-Number: 1175 Class: 3 Packing group: II  
Proper shipping name: Ethylbenzene  
Marine pollutant: No  
Poison Inhalation Hazard: No

**IMDG**

UN-Number: 1175 Class: 3 Packing group: II EMS-No: F-E, S-D  
Proper shipping name: ETHYLBENZENE  
Marine pollutant: No

**IATA**

UN-Number: 1175 Class: 3 Packing group: II  
Proper shipping name: Ethylbenzene

**15. REGULATORY INFORMATION**

**OSHA Hazards**

Flammable Liquid, Irritant, Carcinogen

**DSL Status**

All components of this product are on the Canadian DSL list.

**SARA 302 Components**

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**

Ethylbenzene	CAS-No. 100-41-4	Revision Date 1987-01-01
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**SARA 311/312 Hazards**

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

Ethylbenzene	CAS-No. 100-41-4	Revision Date 1987-01-01
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**Pennsylvania Right To Know Components**

Ethylbenzene	CAS-No. 100-41-4	Revision Date 1987-01-01
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**New Jersey Right To Know Components**

Ethylbenzene

CAS-No.  
100-41-4Revision Date  
1987-01-01**California Prop. 65 Components**

WARNING! This product contains a chemical known in the State of California to cause cancer.  
Ethylbenzene

CAS-No.  
100-41-4Revision Date  
2004-06-11**16. OTHER INFORMATION****Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

## SIGMA-ALDRICH

## MATERIAL SAFETY DATA SHEET

Date Printed: 05/22/2009

Date Updated: 05/01/2009

Version 1.12

## Section 1 - Product and Company Information

Product Name METHYLCYCLOHEXANE, REAGENTPLUS, 99%  
Product Number M37889  
Brand SIAL

Company Sigma-Aldrich  
Address 3050 Spruce Street  
SAINT LOUIS MO 63103 US  
Technical Phone: 800-325-5832  
Fax: 800-325-5052  
Emergency Phone: 314-776-6555

## Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
METHYLCYCLOHEXANE	108-87-2	No

Formula C7H14  
Synonyms Cyclohexylmethane \* Hexahydrotoluene \*  
Methylcyclohexane (ACGIH:OSHA) \*  
Metylocykloheksan (Polish) \* Sextone B \* Toluene  
hexahydride \* Toluene, hexahydro- \*  
Hexahydrotoluene  
RTECS Number: GV6125000

## Section 3 - Hazards Identification

## EMERGENCY OVERVIEW

Flammable (USA) Highly Flammable (EU). Harmful. Dangerous for the environment.  
Irritating to skin. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness.

## HMIS RATING

HEALTH: 2  
FLAMMABILITY: 3  
REACTIVITY: 0

## NFPA RATING

HEALTH: 2  
FLAMMABILITY: 3  
REACTIVITY: 0

For additional information on toxicity, please refer to Section 11.

## Section 4 - First Aid Measures

## ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

**INHALATION EXPOSURE**

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

**DERMAL EXPOSURE**

In case of contact, immediately wash skin with soap and copious amounts of water.

**EYE EXPOSURE**

In case of contact, immediately flush eyes with copious amounts of water for at least 15 minutes.

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**Section 5 - Fire Fighting Measures**

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**FLAMMABLE HAZARDS**

Flammable Hazards: Yes

**EXPLOSION HAZARDS**

Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur under fire conditions.

**FLASH POINT**

24.8 °F - 4.0 °C Method: closed cup

**EXPLOSION LIMITS**

Lower: 1.1 % Upper: 6.7 %

**AUTOIGNITION TEMP**

283 °C

**FLAMMABILITY**

N/A

**EXTINGUISHING MEDIA**

Suitable: For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

**FIREFIGHTING**

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.  
Specific Hazard(s): Flammable liquid. Emits toxic fumes under fire conditions.

---

**Section 6 - Accidental Release Measures**

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**PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL**

Evacuate area. Shut off all sources of ignition.

**PROCEDURE(S) OF PERSONAL PRECAUTION(S)**

Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves.

**METHODS FOR CLEANING UP**

Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

EPI00177



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Section 7 - Handling and Storage

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## HANDLING

User Exposure: Avoid breathing vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

## STORAGE

Suitable: Keep container closed. Keep away from heat, sparks, and open flame.

---

## Section 8 - Exposure Controls / PPE

## ENGINEERING CONTROLS

Safety shower and eye bath. Use nonsparking tools. Mechanical exhaust required.

## PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.  
Hand: Compatible chemical-resistant gloves.  
Eye: Chemical safety goggles.

## GENERAL HYGIENE MEASURES

Wash thoroughly after handling. Wash contaminated clothing before reuse.

## EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	400 PPM
USA	MSHA Standard-air	TWA	500 PPM (2000 MG/M3)
USA	OSHA.	PEL	8H TWA 500 PPM (2000 MG/M3)
New Zealand	OEL		
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	400 PPM

## EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	1600 MG/M3
Poland		NDSch	3000 MG/M3
Poland		NDSP	-

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## Section 9 - Physical/Chemical Properties

Appearance	Physical State: Liquid Color: Colorless		
Property	Value	At Temperature or Pressure	
Molecular Weight	98.19 AMU		
pH	N/A		
BP/BP Range	101 °C		
MP/MP Range	- 126.0 °C		
Freezing Point	N/A		
Vapor Pressure	37 mmHg	20 °C	
Vapor Density	3.4 g/l		EPI00178
Saturated Vapor Conc.	N/A		

SG/Density	0.77 g/cm <sup>3</sup>	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	24.8 °F - 4.0 °C	Method: closed cup
Explosion Limits	Lower: 1.1 % Upper: 6.7 %	
Flammability	N/A	
Autoignition Temp	283 °C	
Refractive Index	1.422	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

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#### Section 10 - Stability and Reactivity

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##### STABILITY

Stable: Stable.

Materials to Avoid: Strong oxidizing agents.

##### HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

##### HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

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#### Section 11 - Toxicological Information

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##### ROUTE OF EXPOSURE

Skin Contact: Causes skin irritation.

Skin Absorption: May be harmful if absorbed through the skin.

Eye Contact: May cause eye irritation.

Inhalation: Harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.

Ingestion: May be harmful if swallowed.

##### SIGNS AND SYMPTOMS OF EXPOSURE

Prolonged exposure can cause: Narcotic effect.

##### TOXICITY DATA

Oral

Mouse

2250 mg/kg

LD50

Inhalation

Mouse

41,500 mg/m<sup>3</sup>

LC50

Inhalation

Rabbit  
15,227 ppm  
LC50

Remarks: Gastrointestinal: Changes in structure or function of salivary glands. Behavioral: Convulsions or effect on seizure threshold. Behavioral: General anesthetic.

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#### Section 12 - Ecological Information

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No data available.

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#### Section 13 - Disposal Considerations

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##### APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

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#### Section 14 - Transport Information

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##### DOT

Proper Shipping Name: Methylcyclohexane  
UN#: 2296  
Class: 3  
Packing Group: Packing Group II  
Hazard Label: Flammable liquid  
PIH: Not PIH

##### IATA

Proper Shipping Name: Methylcyclohexane  
IATA UN Number: 2296  
Hazard Class: 3  
Packing Group: II

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#### Section 15 - Regulatory Information

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##### EU DIRECTIVES CLASSIFICATION

Symbol of Danger: F-Xn-N  
Indication of Danger: Highly Flammable. Harmful. Dangerous for the environment.  
R: 11-38-51/53-65-67  
Risk Statements: Highly flammable. Irritating to skin. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness.  
S: 9-16-33-61-62  
Safety Statements: Keep container in a well-ventilated place. Keep away from sources of ignition - no smoking. Take precautionary measures against static discharges. Avoid release to the environment. Refer to special instructions/safety data sheets. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

##### US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Flammable (USA) Highly Flammable (EU). Harmful. Dangerous for the environment.  
Risk Statements: Irritating to skin. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness.

Safety Statements: Keep container in a well-ventilated place. Keep away from sources of ignition - no smoking. Take precautionary measures against static discharges. Avoid release to the environment. Refer to special instructions/safety data sheets. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: No

TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes

NDSL: No

---

Section 16 - Other Information

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DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2009 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.

**SIGMA-ALDRICH****Material Safety Data Sheet**Version 3.0  
Revision Date 12/28/2008  
Print Date 05/22/2009**1. PRODUCT AND COMPANY IDENTIFICATION**

Product name : *m*-Xylene

Product Number : 95672

Brand : Sigma-Aldrich

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

Emergency Phone # : (314) 776-6555

**2. COMPOSITION/INFORMATION ON INGREDIENTS**

Synonyms : 1,3-Dimethylbenzene

Formula :  $C_8H_{10}$

Molecular Weight : 106.17 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<i>m</i> -Xylene			
108-38-3	203-576-3	601-022-00-9	-

**3. HAZARDS IDENTIFICATION****Emergency Overview****OSHA Hazards**

Flammable Liquid, Irritant, Reproductive hazard

**Target Organs**

Nerves., Liver, Kidney

**HMIS Classification**

Health Hazard: 2

Chronic Health Hazard: \*

Flammability: 3

Physical hazards: 0

**NFPA Rating**

Health Hazard: 2

Fire: 3

Reactivity Hazard: 0

**Potential Health Effects**

<b>Inhalation</b>	May be harmful if inhaled. Causes respiratory tract irritation.
<b>Skin</b>	May be harmful if absorbed through skin. Causes skin irritation.
<b>Eyes</b>	--Causes eye irritation.
<b>Ingestion</b>	May be harmful if swallowed.

#### 4. FIRST AID MEASURES

##### General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

##### If inhaled

If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

##### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

##### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

##### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

#### 5. FIRE-FIGHTING MEASURES

##### Flammable properties

Flash point 25.0 °C (77.0 °F) - closed cup

Ignition temperature 465 °C (869 °F)

##### Suitable extinguishing media

For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

##### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

##### Further information

Use water spray to cool unopened containers.

#### 6. ACCIDENTAL RELEASE MEASURES

##### Personal precautions

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

##### Environmental precautions

Do not let product enter drains.

##### Methods for cleaning up

Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

#### 7. HANDLING AND STORAGE

##### Handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.



**Storage**

Keep container tightly closed in a dry and well-ventilated place. Store in cool place.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Components with workplace control parameters**

Components	CAS-No.	Value	Control parameters	Update	Basis
m-Xylene	108-38-3	TWA	100 ppm 434 mg/m <sup>3</sup>	1996-05-18	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004; Committees on Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)
Remarks	The agent (mixture, or exposure circumstance) is not classifiable as to its carcinogenicity to humans. Substances for which there is a Biological Exposure Index or Indices. 1996 Adoption Refers to Appendix A -- Carcinogens.				
		STEL	150 ppm 651 mg/m <sup>3</sup>	1996-05-18	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004; Committees on Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)
	The agent (mixture, or exposure circumstance) is not classifiable as to its carcinogenicity to humans. Substances for which there is a Biological Exposure Index or Indices. 1996 Adoption Refers to Appendix A -- Carcinogens.				
		TWA	100 ppm 435 mg/m <sup>3</sup>	1993-06-30	US. Department of Labor - Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL) 29 CFR 1910.1000 Air Contaminants.
		TWA	100 ppm 435 mg/m <sup>3</sup>	1989-03-01	US. Department of Labor - Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1000 Z-1-A

		STEL	150 ppm 655 mg/m3	1989-03-01	US. Department of Labor - Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1000 Z-1-A
		TWA	100 ppm 434 mg/m3	1996-05-18	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004; Committees on Threshold Limit Values (TLVs ) and Biological Exposure Indices (BEIs)
	The agent (mixture , or exposure circumstance) is not classifiable as to its carcinogenicity to humans . Substances for which there is a Biological Exposure Index or Indices Refers to Appendix A -- Carcinogens. 1996 Adoption				
		STEL	150 ppm 651 mg/m3	1996-05-18	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004; Committees on Threshold Limit Values (TLVs ) and Biological Exposure Indices (BEIs)
	The agent (mixture , or exposure circumstance) is not classifiable as to its carcinogenicity to humans . Substances for which there is a Biological Exposure Index or Indices 1996 Adoption Refers to Appendix A -- Carcinogens.				

**Personal protective equipment****Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**

Handle with gloves.

**Eye protection**

Safety glasses

**Skin and body protection**

Choose body protection according to the amount and concentration of the dangerous substance at the work place.

**Hygiene measures**

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**9. PHYSICAL AND CHEMICAL PROPERTIES****Appearance**

Form	liquid
Colour	colourless

**Safety data**

pH	no data available
Melting point	48 °C (118 °F)
Boiling point	138 - 139 °C (280 - 282 °F)
Flash point	25.0 °C (77.0 °F) - closed cup
Ignition temperature	465 °C (869 °F)
Lower explosion limit	1.1 %(V)
Upper explosion limit	7 %(V)
Vapour pressure	8.0 hPa (6.0 mmHg) at 20.0 °C (68.0 °F) 21.3 hPa (16.0 mmHg) at 37.7 °C (99.9 °F)
Density	0.868 g/mL at 25 °C (77 °F)
Water solubility	no data available

**10. STABILITY AND REACTIVITY****Storage stability**

Stable under recommended storage conditions.

**Conditions to avoid**

Heat, flames and sparks.

**Materials to avoid**

Strong oxidizing agents

**Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides

**Hazardous reactions**

Vapours may form explosive mixture with air.

**11. TOXICOLOGICAL INFORMATION****Acute toxicity**

LD50 Oral - rat - 5,000 mg/kg

LD50 Dermal - rabbit - 12,182 mg/kg

**Irritation and corrosion**

Skin - rabbit - Skin irritation - 24 h

Eyes - rabbit - Severe eye irritation - 24 h

**Sensitisation**

no data available

#### Chronic exposure

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: Group 3 - Not classifiable as to carcinogenicity to humans (m-Xylene)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

#### Signs and Symptoms of Exposure

Liver injury may occur., Kidney injury may occur., Blood disorders, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, narcosis, Lung irritation, chest pain, pulmonary edema, Central nervous system depression, Dermatitis, Gastrointestinal disturbance

#### Potential Health Effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	May be harmful if swallowed.
Target Organs	Nerves., Liver, Kidney,

#### Additional Information

RTECS: ZE2275000

## 12. ECOLOGICAL INFORMATION

#### Elimination information (persistence and degradability)

no data available

#### Ecotoxicity effects

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 8.4 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates.	Immobilization EC50 - Daphnia magna (Water flea) - 9.55 mg/l - 48 h

#### Further Information on ecology

no data available

## 13. DISPOSAL CONSIDERATIONS

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

## 14. TRANSPORT INFORMATION

Sigma-Aldrich - 95672

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EP100187

**DOT (US)**

UN-Number: 1307 Class: 3  
 Proper shipping name: Xylenes  
 Marine pollutant: No  
 Poison Inhalation Hazard: No

Packing group: III

**IMDG**

UN-Number: 1307 Class: 3  
 Proper shipping name: XYLENES  
 Marine pollutant: No

Packing group: III

EMS-No: F-E, S-D

**IATA**

UN-Number: 1307 Class: 3  
 Proper shipping name: Xylenes

Packing group: III

**15. REGULATORY INFORMATION****OSHA Hazards**

Flammable Liquid, Irritant, Reproductive hazard

**DSL Status**

All components of this product are on the Canadian DSL list.

**SARA 302 Components**

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**

m-Xylene	CAS-No. 108-38-3	Revision Date 1987-01-01
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**SARA 311/312 Hazards**

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

m-Xylene	CAS-No. 108-38-3	Revision Date 1987-01-01
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**Pennsylvania Right To Know Components**

m-Xylene	CAS-No. 108-38-3	Revision Date 1987-01-01
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**New Jersey Right To Know Components**

m-Xylene	CAS-No. 108-38-3	Revision Date 1987-01-01
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**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

**16. OTHER INFORMATION****Further Information**

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**SIGMA-ALDRICH****Material Safety Data Sheet**Version 3.0  
Revision Date 01/03/2009  
Print Date 05/22/2009**1. PRODUCT AND COMPANY IDENTIFICATION**

Product name : o-Xylene

Product Number : 95662

Brand : Sigma-Aldrich

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

Emergency Phone # : (314) 776-6555

**2. COMPOSITION/INFORMATION ON INGREDIENTS**

Synonyms : 1,2-Dimethylbenzene

Formula : C<sub>8</sub>H<sub>10</sub>

Molecular Weight : 106.17 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>o-Xylene</b>			
95-47-6	202-422-2	601-022-00-9	-

**3. HAZARDS IDENTIFICATION****Emergency Overview**

**OSHA Hazards**  
Flammable Liquid

**Target Organs**

Liver, Kidney, Nerves.

**HMIS Classification**

Health Hazard: 1

Chronic Health Hazard: \*

Flammability: 3

Physical hazards: 0

**NFPA Rating**

Health Hazard: 2

Fire: 3

Reactivity Hazard: 0

**Potential Health Effects**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.
<b>Ingestion</b>	May be harmful if swallowed.

#### 4. FIRST AID MEASURES

##### General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

##### If inhaled

If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

##### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

##### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

##### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

#### 5. FIRE-FIGHTING MEASURES

##### Flammable properties

Flash point 31.0 °C (87.8 °F) - closed cup

Ignition temperature 464 °C (867 °F)

##### Suitable extinguishing media

For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

##### Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

##### Further information

Use water spray to cool unopened containers.

#### 6. ACCIDENTAL RELEASE MEASURES

##### Personal precautions

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Beware of vapors accumulating to form explosive concentrations. Vapours can accumulate in low areas.

##### Environmental precautions

Do not let product enter drains.

##### Methods for cleaning up

Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

#### 7. HANDLING AND STORAGE

##### Handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

**Storage**

Keep container tightly closed in a dry and well-ventilated place. Store in cool place.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Components with workplace control parameters**

Components	CAS No.	Value	Control parameters	Update	Basis
o-Xylene	95-47-6	TWA	100 ppm 434 mg/m <sup>3</sup>	1996-05-18	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004; Committees on Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)
Remarks	The agent (mixture, or exposure circumstance) is not classifiable as to its carcinogenicity to humans. Substances for which there is a Biological Exposure Index or Indices. 1996 Adoption Refers to Appendix A -- Carcinogens.				
		STEL	150 ppm 651 mg/m <sup>3</sup>	1996-05-18	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004; Committees on Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)
	The agent (mixture, or exposure circumstance) is not classifiable as to its carcinogenicity to humans. Substances for which there is a Biological Exposure Index or Indices. 1996 Adoption Refers to Appendix A -- Carcinogens.				
		TWA	100 ppm 435 mg/m <sup>3</sup>	1993-06-30	US. Department of Labor - Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL) 29 CFR 1910.1000 Air Contaminants.
		TWA	100 ppm 435 mg/m <sup>3</sup>	1989-03-01	US. Department of Labor - Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1000 Z-1-A

		STEL	150 ppm 655 mg/m <sup>3</sup>	1989-03-01	US. Department of Labor - Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1000 Z-1-A
		TWA	100 ppm 434 mg/m <sup>3</sup>	1996-05-18	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004:Committees on Threshold Limit Values (TLVs ) and Biological Exposure Indices (BEIs)
The agent (mixture , or exposure circumstance) is not classifiable as to its carcinogenicity to humans . Substances for which there is a Biological Exposure Index or Indices Refers to Appendix A – Carcinogens. 1996 Adoption					

#### Personal protective equipment

##### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

##### Hand protection

For prolonged or repeated contact use protective gloves.

##### Eye protection

Safety glasses

##### Skin and body protection

Choose body protection according to the amount and concentration of the dangerous substance at the work place.

##### Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

#### 9. PHYSICAL AND CHEMICAL PROPERTIES

##### Appearance

Form                      liquid  
Colour                    colourless

##### Safety data

pH                        no data available  
Melting point        -26 - -23 °C (-15 - -9 °F)  
Boiling point        143 - 145 °C (289 - 293 °F)

Flash point 31.0 °C (87.8 °F) - closed cup  
 Ignition temperature 464 °C (867 °F)  
 Lower explosion limit 0.9 %(V)  
 Upper explosion limit 6.7 %(V)  
 Vapour pressure 21.3 hPa (16.0 mmHg) at 37.7 °C (99.9 °F)  
 8.8 hPa (6.6 mmHg) at 25.0 °C (77.0 °F)  
 Density 0.879 g/mL at 20 °C (68 °F)  
 Water solubility no data available  
 Partition coefficient: log Pow: 3.12  
 n-octanol/water

## 10. STABILITY AND REACTIVITY

### Storage stability

Stable under recommended storage conditions.

### Conditions to avoid

Heat, flames and sparks.

### Materials to avoid

Oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

### Hazardous reactions

Vapours may form explosive mixture with air.

## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

LD50 Intraperitoneal - mouse - 1,364 mg/kg

### Irritation and corrosion

no data available

### Sensitisation

no data available

### Chronic exposure

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: Group 3 - Not classifiable as to carcinogenicity to humans (o-Xylene)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

### Signs and Symptoms of Exposure

narcosis, Lung irritation, chest pain, pulmonary edema, Central nervous system depression, Dermatitis, Gastrointestinal disturbance, Liver injury may occur., Kidney injury may occur., Blood disorders

#### Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	May be harmful if swallowed.
Target Organs	Liver, Kidney, Nerves.,

**Additional Information**  
RTECS: ZE2450000

## 12. ECOLOGICAL INFORMATION

#### Elimination information (persistence and degradability)

no data available

#### Ecotoxicity effects

Toxicity to fish	LC50 - <i>Lepomis macrochirus</i> (Bluegill) - 16.10 mg/l - 96 h
	LC50 - <i>Carassius auratus</i> (goldfish) - 13.00 mg/l - 24 h
Toxicity to daphnia and other aquatic invertebrates.	EC50 - <i>Daphnia magna</i> (Water flea) - 1.39 - 1.87 mg/l - 48 h
Toxicity to algae	EC50 - <i>Pseudokirchneriella subcapitata</i> (green algae) - 4.70 mg/l - 72 h
	EC50 - <i>Chlorella vulgaris</i> (Fresh water algae) - 55.00 mg/l - 24 h

#### Further information on ecology

no data available

## 13. DISPOSAL CONSIDERATIONS

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

## 14. TRANSPORT INFORMATION

#### DOT (US)

UN-Number: 1307 Class: 3	Packing group: III
Proper shipping name: Xylenes	
Marine pollutant: No	
Poison Inhalation Hazard: No	

#### IMDG

UN-Number: 1307 Class: 3	Packing group: III	EMS-No: F-E, S-D
Proper shipping name: XYLENES		
Marine pollutant: No		

#### IATA



UN-Number: 1307 Class: 3  
 Proper shipping name: Xylenes

Packing group: III

## 15. REGULATORY INFORMATION

**OSHA Hazards**  
 Flammable Liquid

**DSL Status**  
 All components of this product are on the Canadian DSL list.

**SARA 302 Components**  
 SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

### SARA 313 Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	1987-01-01

**SARA 311/312 Hazards**  
 Fire Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	1987-01-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	1987-01-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
o-Xylene	95-47-6	1987-01-01

### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

## 16. OTHER INFORMATION

### Further information

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 The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

## SIGMA-ALDRICH

## MATERIAL SAFETY DATA SHEET

Date Printed: 05/22/2009  
Date Updated: 02/23/2009  
Version 1.9

## Section 1 - Product and Company Information

Product Name P-XYLENE, CHROMASOLV®, FOR HPLC, >=99%  
Product Number 317195  
Brand SIAL  
  
Company Sigma-Aldrich  
Address 3050 Spruce Street  
SAINT LOUIS MO 63103 US  
  
Technical Phone: 800-325-5832  
Fax: 800-325-5052  
Emergency Phone: 314-776-6555

## Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
P-XYLENE	106-42-3	Yes

Formula C8H10  
Synonyms Chromar \* p-Dimethylbenzene \* 1,4-Dimethylbenzene  
\* p-Methyltoluene \* Scintillar \* 1,4-Xylene \*  
p-Xylene (ACGIH:OSHA) \* P-Xylol  
RTECS Number: ZE2625000

## Section 3 - Hazards Identification

## EMERGENCY OVERVIEW

Flammable. Irritant.  
Harmful by inhalation, in contact with skin and if swallowed.  
Irritating to eyes, respiratory system and skin.  
Readily absorbed through skin. Target organ(s): Nerves. Liver.  
Kidneys.

## HMIS RATING

HEALTH: 2\*  
FLAMMABILITY: 3  
REACTIVITY: 0

## NFPA RATING

HEALTH: 2  
FLAMMABILITY: 3  
REACTIVITY: 0

\*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

## Section 4 - First Aid Measures

## ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

#### INHALATION EXPOSURE

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

#### DERMAL EXPOSURE

In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

#### EYE EXPOSURE

In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

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### Section 5 - Fire Fighting Measures

---

#### FLAMMABLE HAZARDS

Flammable Hazards: Yes

#### EXPLOSION HAZARDS

Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur under fire conditions. Forms explosive mixtures in air.

#### FLASH POINT

77 °F 25 °C Method: closed cup

#### EXPLOSION LIMITS

Lower: 1.1 % Upper: 7 %

#### AUTOIGNITION TEMP

529 °C

#### FLAMMABILITY

N/A

#### EXTINGUISHING MEDIA

Suitable: For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

#### FIREFIGHTING

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Flammable liquid. Emits toxic fumes under fire conditions.

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### Section 6 - Accidental Release Measures

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#### PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area. Shut off all sources of ignition.

#### PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

#### METHODS FOR CLEANING UP

Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors.

EP100198

Ventilate area and wash spill site after material pickup is complete.

## Section 7 - Handling and Storage

### HANDLING

User Exposure: Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

### STORAGE

Suitable: Keep container closed. Keep away from heat, sparks, and open flame.

## Section 8 - Exposure Controls / PPE

### ENGINEERING CONTROLS

Safety shower and eye bath. Use nonsparking tools. Mechanical exhaust required.

### PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.  
Hand: Compatible chemical-resistant gloves.  
Eye: Chemical safety goggles.

### GENERAL HYGIENE MEASURES

Wash thoroughly after handling. Wash contaminated clothing before reuse.

### EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	STEL	150 PPM
USA	ACGIH	TWA	100 PPM
USA	MSHA Standard-air	TWA	100 PPM (440 MG/M3) (SKIN)
USA	OSHA.	PEL	8H TWA 100 PPM (435 MG/M3)
USA	NIOSH	TWA	100 PPM
		STEL	150 PPM

### EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	100 mg/m3
Poland		NDSch	350 mg/m3
Poland		NDSP	

## Section 9 - Physical/Chemical Properties

Appearance	Physical State: Clear liquid Color: Colorless		
Property	Value	At Temperature or Pressure	
Molecular Weight	106.17 AMU		
pH	N/A		
BP/BP Range	137.0 - 138.0 °C		
MP/MP Range	13 °C		
Freezing Point	N/A		
Vapor Pressure	9 mmHg	20 °C	EP100199

Vapor Density	3.7 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	0.861 g/cm3	
Bulk Density	N/A	
Odor Threshold	0.05 ppm	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	28.3 mN/m	20 °C
Partition Coefficient	Log Kow: 3.15	
Decomposition Temp.	N/A	
Flash Point	77 °F 25 °C	Method: closed cup
Explosion Limits	Lower: 1.1 % Upper: 7 %	
Flammability	N/A	
Autoignition Temp	529 °C	
Refractive Index	1.495	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	Solubility in Water: 0.2 mg/ml H2O	

N/A = not available

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## Section 10 - Stability and Reactivity

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### STABILITY

Stable: Stable.

Materials to Avoid: Strong oxidizing agents.

### HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

### HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

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## Section 11 - Toxicological Information

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### ROUTE OF EXPOSURE

Skin Contact: Causes skin irritation.

Skin Absorption: Harmful if absorbed through skin.

Eye Contact: Causes eye irritation.

Inhalation: Material is irritating to mucous membranes and upper respiratory tract. Harmful if inhaled.

Ingestion: Harmful if swallowed.

### TARGET ORGAN(S) OR SYSTEM(S)

Nerves. Liver. Kidneys.

### SIGNS AND SYMPTOMS OF EXPOSURE

Exposure can cause: Narcotic effect. Lung irritation, chest pain, and edema which may be fatal. CNS depression.

Gastrointestinal disturbances. Damage to the liver. Damage to the kidneys. Blood effects.

### TOXICITY DATA

Oral

Rat

5000 mg/kg

EP100200

LD50

Inhalation

Rat

4,550 ppm

LC50

Remarks: Lungs, Thorax, or Respiration: Chronic pulmonary edema.  
Liver: Other changes. Blood: Changes in cell count (unspecified).

Intraperitoneal

Rat

3810 MG/KG

LD50

Remarks: Blood: Changes in cell count (unspecified). Liver: Other changes. Lungs, Thorax, or Respiration: Chronic pulmonary edema.

Intraperitoneal

Mouse

2450 UL/KG

LD50

#### IARC CARCINOGEN LIST

Rating: Group 3

#### ACGIH CARCINOGEN LIST

Rating: A4

#### CHRONIC EXPOSURE - TERATOGEN

Species: Rat

Dose: 3000 MG/M3/24H

Route of Application: Inhalation

Exposure Time: (9-10D PREG)

Result: Maternal Effects: Other effects. Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Endocrine: Estrogenic.

Species: Rat

Dose: 150 MG/M3/24H

Route of Application: Inhalation

Exposure Time: (7-14D PREG)

Result: Specific Developmental Abnormalities: Musculoskeletal system. Effects on Embryo or Fetus: Extra embryonic structures (e.g., placenta, umbilical cord).

Species: Mouse

Dose: 12 MG/KG

Route of Application: Oral

Exposure Time: (12-15D PREG)

Result: Specific Developmental Abnormalities: Craniofacial (including nose and tongue).

Species: Mouse

Dose: 500 MG/M3/12H

Route of Application: Inhalation

Exposure Time: (6-15D PREG)

Result: Specific Developmental Abnormalities: Musculoskeletal system. Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

EPI00201

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Result: May cause reproductive disorders.

Species: Rat

Dose: 3000 MG/M3/24H

Route of Application: Inhalation

Exposure Time: (7-14D PREG)

Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat

Dose: 7 GM/M3

Route of Application: Inhalation

Exposure Time: (7-16D PREG)

Result: Maternal Effects: Other effects.

Species: Rabbit

Dose: 1 GM/M3/24H

Route of Application: Inhalation

Exposure Time: (7-20D PREG)

Result: Effects on Embryo or Fetus: Fetal death. Effects on Fertility: Abortion. Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

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Section 12 - Ecological Information

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PHYSICAL PROPERTIES AFFECTING ECOTOXICITY

BOD after 5 Days: 44 %

ACUTE ECOTOXICITY TESTS

Test Type: EC50 Algae

Species: *Selenastrum capricornutum* resp.

Time: 72 h

Value: 3.2 - 4.4 mg/l

Test Type: EC50 Daphnia

Species: *Daphnia magna*

Time: 48 h

Value: 35.5 - 63.1 mg/l

Test Type: LC50 Fish

Species: *Onchorhynchus mykiss* (Rainbow trout)

Time: 96 h

Value: 2.6 mg/l

Test Type: LC50 Fish

Species: *Carassius auratus* (Goldfish)

Time: 24 h

Value: 18 mg/l

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Section 13 - Disposal Considerations

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APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.



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Section 14 - Transport Information

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DOT

Proper Shipping Name: Xylenes  
UN#: 1307  
Class: 3  
Packing Group: Packing Group III  
Hazard Label: Flammable liquid  
PIH: Not PIH

IATA

Proper Shipping Name: Xylenes  
IATA UN Number: 1307  
Hazard Class: 3  
Packing Group: III

---

Section 15 - Regulatory Information

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EU DIRECTIVES CLASSIFICATION

Symbol of Danger: Xn  
Indication of Danger: Harmful.  
R: 10-20/21-38  
Risk Statements: Flammable. Harmful by inhalation and in contact with skin. Irritating to skin.  
S: 25  
Safety Statements: Avoid contact with eyes.

US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Flammable. Irritant.  
Risk Statements: Harmful by inhalation, in contact with skin and if swallowed. Irritating to eyes, respiratory system and skin.  
Safety Statements: Keep away from sources of ignition - no smoking. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing.  
US Statements: Readily absorbed through skin. Target organ(s): Nerves. Liver. Kidneys.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: Yes  
DEMINIMIS: 1 %  
NOTES: This product is subject to SARA section 313 reporting requirements.  
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.  
DSL: Yes  
NDSL: No

---

Section 16 - Other Information

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DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our

knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2009 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.

## SIGMA-ALDRICH

## MATERIAL SAFETY DATA SHEET

Date Printed: 10/14/2006

Date Updated: 09/07/2006

Version 1.18

## Section 1 - Product and Company Information

Product Name	TOLUENE, ANHYDROUS, 99.8%
Product Number	244511
Brand	ALDRICH
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

## Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
TOLUENE	108-88-3	Yes
Formula	C7H8	
Synonyms	Antisal 1a * Benzene, methyl- * CP 25 * Methacide * Methane, phenyl- * Methylbenzene * Methylbenzol * NCI-C07272 * Phenylmethane * RCRA waste number U220 * Tolueen (Dutch) * Toluen (Czech) * Toluene (ACGIH:OSHA) * Tolueno (Spanish) * Toluol * Toluolo (Italian) * Tolu-Sol	
RTECS Number:	XS5250000	

## Section 3 - Hazards Identification

## EMERGENCY OVERVIEW

Flammable (USA) Highly Flammable (EU). Harmful.  
Irritating to eyes and skin. Harmful: danger of serious damage to health by prolonged exposure through inhalation. Possible risk of harm to the unborn child. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness.  
Target organ(s): Liver. Kidneys. Calif. Prop. 65 developmental hazard.

## HMIS RATING

HEALTH: 2\*  
FLAMMABILITY: 3  
REACTIVITY: 0

## NFPA RATING

HEALTH: 2  
FLAMMABILITY: 3  
REACTIVITY: 0

\*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

## Section 4 - First Aid Measures

---

ORAL EXPOSURE

If swallowed, do not induce vomiting; call a physician immediately.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE

In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE

In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

---

Section 5 - Fire Fighting Measures

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FLAMMABLE HAZARDS

Flammable Hazards: Yes

EXPLOSION HAZARDS

Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur under fire conditions.

FLASH POINT

40 °F 4 °C Method: closed cup

EXPLOSION LIMITS

Lower: 1.2 % Upper: 7 %

AUTOIGNITION TEMP

535 °C

FLAMMABILITY

N/A

EXTINGUISHING MEDIA

Suitable: Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Flammable liquid. Emits toxic fumes under fire conditions.

---

Section 6 - Accidental Release Measures

---

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area. Shut off all sources of ignition. Use nonsparking tools.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP

Ventilate area and wash spill site after material pickup is EPI00206

complete. Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors.

---

## Section 7 - Handling and Storage

---

### HANDLING

User Exposure: Do not breathe vapor. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

### STORAGE

Suitable: Keep tightly closed. Keep away from heat, sparks, and open flame.

---

## Section 8 - Exposure Controls / PPE

---

### ENGINEERING CONTROLS

Safety shower and eye bath. Use nonsparking tools. Mechanical exhaust required.

### PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.

Hand: Compatible chemical-resistant gloves.

Eye: Chemical safety goggles.

### GENERAL HYGIENE MEASURES

Remove and wash contaminated clothing promptly. Wash thoroughly after handling.

### EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	50 PPM
Remarks: Skin			
USA	MSHA Standard-air	TWA	100 PPM (375 MG/M3) (SKIN)
USA	OSHA.	PEL	8H TWA 200 PPM;CL 300;PK 500/1
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	100 PPM
		STEL	150 PPM

### EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	100 MG/M3
Poland		NDSch	350 MG/M3
Poland		NDSP	-
USA	OSHA.	PEL TWA	200 ppm
Remarks: 8 HOUR			
USA	OSHA.	Ceiling	300 ppm
USA	OSHA.	PEL	500 ppm
Remarks: TOLUENE			
USA	NIOSH	REL TWA	375 mg/m3
			100 ppm
Remarks: 10 HOURS			
USA	NIOSH	REL STEL	150 mg/m3
			560 ppm

Remarks: 15 MINUTES

USA ACGIH TWA 50 ppm  
 Remarks: Skin  
 IDLH  
 500 ppm

### Section 9 - Physical/Chemical Properties

Appearance	Physical State: Liquid Color: Colorless	
Property	Value	At Temperature or Pressure
Molecular Weight	92.14 AMU	
pH	N/A	
BP/BP Range	110.6 °C	760 mmHg
MP/MP Range	- 93.0 °C	
Freezing Point	N/A	
Vapor Pressure	21.75 mmHg	20 °C
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	0.865 g/cm3	25 °C
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	40 °F 4 °C	Method: closed cup
Explosion Limits	Lower: 1.2 % Upper: 7 %	
Flammability	N/A	
Autoignition Temp	535 °C	
Refractive Index	1.496	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

### Section 10 - Stability and Reactivity

#### STABILITY

Stable: Stable.

Materials to Avoid: Strong oxidizing agents.

#### HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

#### HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

### Section 11 - Toxicological Information

#### ROUTE OF EXPOSURE

Skin Contact: Causes skin irritation.

Skin Absorption: May be harmful if absorbed through the skin.

EPI00208

Eye Contact: Causes eye irritation.

Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.

Ingestion: May be harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)

Bladder. Kidneys. Liver. Brain.

SIGNS AND SYMPTOMS OF EXPOSURE

Lung irritation, chest pain, and edema which may be fatal.

Exposure can cause: Inhalation studies on toluene have demonstrated the development of inflammatory and ulcerous lesions of the penis, prepuce, and scrotum in animals.

CONDITIONS AGGRAVATED BY EXPOSURE

May cause nervous system disturbances.

TOXICITY DATA

Oral

Rat

> 5,580 mg/kg

LD50

Oral

rat, male

\*

LD50

4 H

Inhalation

Rat

28,100 mg/m3

LC50

4 H

Inhalation

Rat

12,500.0 - 28,800.0 mg/m3

LC50

Skin

Rabbit

12,124 mg/kg

LD50

Oral

Man

719 UL/KG

LDLO

Remarks: Cardiac:Other changes. Lungs, Thorax, or Respiration:Acute pulmonary edema. Liver:Other changes.

Oral

Human

50 mg/kg

LDLO

Oral

Rat

636 mg/kg

LD50

Inhalation

Rat

49,000 mg/m3

LC50



Intraperitoneal

Rat  
1332 MG/KG  
LD50

Intravenous

Rat  
1960 MG/KG  
LD50

Inhalation

Mouse  
400 ppm  
LC50

Intraperitoneal

Mouse  
59 MG/KG  
LD50

Subcutaneous

Mouse  
2250 MG/KG  
LD50

Skin

Rabbit  
14100 UL/KG  
LD50

Intraperitoneal

Guinea pig  
500 MG/KG  
LD50

Oral

Mammal  
4000 mg/kg  
LD50

Inhalation

Mammal  
30,000 mg/m3  
LC50

IRRITATION DATA

Eyes

Rabbit  
Remarks: Moderate irritation effect

Skin

Rabbit  
Remarks: Moderate irritation effect

Eyes

Human  
300 ppm

Skin

Rabbit  
435 mg  
Remarks: Mild irritation effect

EPI00210

Skin  
Rabbit  
500 mg  
Remarks: Moderate irritation effect

Skin  
Rabbit  
20 mg  
24H  
Remarks: Moderate irritation effect

Eyes  
Rabbit  
0.87 mg  
Remarks: Mild irritation effect

Eyes  
Rabbit  
2 mg  
24H  
Remarks: Severe irritation effect

Eyes  
Rabbit  
100 mg  
30S  
Remarks: Rinsed

CHRONIC EXPOSURE - CARCINOGEN

Result: This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

NTP CARCINOGEN LIST

Rating: No evidence.  
Species: Mouse/rat  
Route: Inhalation

ACGIH CARCINOGEN LIST

Rating: A4

CHRONIC EXPOSURE - TERATOGEN

Result: May cause congenital malformation in the fetus.

Species: Rat  
Dose: 7280 MG/KG  
Route of Application: Oral  
Exposure Time: (6-19D PREG)  
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat  
Dose: 1500 MG/M3/24H  
Route of Application: Inhalation  
Exposure Time: (1-8D PREG)  
Result: Specific Developmental Abnormalities: Musculoskeletal system. Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat  
Dose: 1000 MG/M3/24H  
Route of Application: Inhalation  
Exposure Time: (7-14D PREG)  
Result: Specific Developmental Abnormalities: Musculoskeletal system.

Species: Rat  
Dose: 800 MG/M3/6H  
Route of Application: Inhalation  
Exposure Time: (14-20D PREG)  
Result: Effects on Newborn: Behavioral. Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Mouse  
Dose: 9 GM/KG  
Route of Application: Oral  
Exposure Time: (6-15D PREG)  
Result: Effects on Embryo or Fetus: Fetal death.

Species: Mouse  
Dose: 15 GM/KG  
Route of Application: Oral  
Exposure Time: (6-15D PREG)  
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Mouse  
Dose: 30 GM/KG  
Route of Application: Oral  
Exposure Time: (6-15D PREG)  
Result: Specific Developmental Abnormalities: Craniofacial (including nose and tongue).

Species: Mouse  
Dose: 500 MG/M3/24H  
Route of Application: Inhalation  
Exposure Time: (6-13D PREG)  
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Mouse  
Dose: 1000 PPM/6H  
Route of Application: Inhalation  
Exposure Time: (2-17D PREG)  
Result: Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse  
Dose: 400 PPM/7H  
Route of Application: Inhalation  
Exposure Time: (7-16D PREG)  
Result: Effects on Newborn: Biochemical and metabolic. Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse  
Dose: 200 PPM/7H  
Route of Application: Inhalation  
Exposure Time: (7-16D PREG)  
Result: Specific Developmental Abnormalities: Urogenital system.

Species: Rabbit

Dose: 100 PPM/6H  
Route of Application: Inhalation  
Exposure Time: (6-18D PREG)  
Result: Specific Developmental Abnormalities: Cardiovascular  
(circulatory) system.

CHRONIC EXPOSURE - MUTAGEN

Species: Rat  
Dose: 30 UMOL/L  
Cell Type: liver  
Mutation test: DNA damage

Species: Rat  
Route: Inhalation  
Dose: 5400 UG/M3/16W-I  
Mutation test: Cytogenetic analysis

Species: Rat  
Route: Subcutaneous  
Dose: 9600 MG/KG  
Exposure Time: 12D  
Mutation test: Cytogenetic analysis

Species: Mouse  
Route: Oral  
Dose: 200 MG/KG  
Mutation test: Micronucleus test

Species: Mouse  
Route: Intraperitoneal  
Dose: 433 UG/KG  
Exposure Time: 24H  
Mutation test: Micronucleus test

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat  
Dose: 9100 MG/KG  
Route of Application: Oral  
Exposure Time: (6-19D PREG)  
Result: Effects on Newborn: Biochemical and metabolic. Effects  
on Newborn: Growth statistics (e.g., reduced weight gain).

Species: Rat  
Dose: 16 ML/KG  
Route of Application: Oral  
Exposure Time: (6-21D PREG)  
Result: Effects on Newborn: Physical.

Species: Rat  
Dose: 6000 PPM/2H  
Route of Application: Inhalation  
Exposure Time: (5W-I)  
Result: Paternal Effects: Spermatogenesis (including genetic  
material, sperm morphology, motility, and count).

Species: Rat  
Dose: 2000 PPM/6H  
Route of Application: Inhalation  
Exposure Time: (7-17D PREG)  
Result: Effects on Newborn: Physical. Maternal Effects: Other

effects.

Species: Rat  
Dose: 1200 PPM/6H  
Route of Application: Inhalation  
Exposure Time: (9-12D PREG)  
Result: Effects on Newborn: Delayed effects.

Species: Rabbit  
Dose: 1 GM/M3/24H  
Route of Application: Inhalation  
Exposure Time: (7-20D PREG)  
Result: Effects on Fertility: Abortion.

Species: Hamster  
Dose: 800 MG/M3/6H  
Route of Application: Inhalation  
Exposure Time: (6-11D PREG)  
Result: Effects on Newborn: Behavioral.

---

## Section 12 - Ecological Information

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### ACUTE ECOTOXICITY TESTS

Test Type: EC50 Algae  
Species: *Chlorella vulgaris*  
Time: 24 h  
Value: 245 mg/l

Test Type: EC50 Algae  
Species: *Selenastrum capricornutum* resp.  
Time: 24 h  
Value: 10 mg/l

Test Type: EC50 Daphnia  
Species: *Daphnia magna*  
Time: 24 h  
Value: 8 mg/l

Test Type: LC50 Fish  
Species: *Lepomis macrochirus* (Bluegill)  
Time: 96 h  
Value: 74.0 - 340.0 mg/l

Test Type: LC50 Fish  
Species: *Onchorhynchus mykiss* (Rainbow trout)  
Time: 96 h  
Value: 7.63 mg/l

---

## Section 13 - Disposal Considerations

---

### APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

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## Section 14 - Transport Information

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DOT

Proper Shipping Name: Toluene

UN#: 1294  
Class: 3  
Packing Group: Packing Group II  
Hazard Label: Flammable liquid  
PIH: Not PIH

IATA

Proper Shipping Name: Toluene  
IATA UN Number: 1294  
Hazard Class: 3  
Packing Group: II

---

Section 15 - Regulatory Information

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EU DIRECTIVES CLASSIFICATION

Symbol of Danger: F-Xn  
Indication of Danger: Highly Flammable. Harmful.  
R: 11-38-48/20-63-65-67  
Risk Statements: Highly flammable. Irritating to skin. Harmful: danger of serious damage to health by prolonged exposure through inhalation. Possible risk of harm to the unborn child. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness.  
S: 36/37-46-62  
Safety Statements: Wear suitable protective clothing and gloves. If swallowed, seek medical advice immediately and show this container or label. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Flammable (USA) Highly Flammable (EU). Harmful.  
Risk Statements: Irritating to eyes and skin. Harmful: danger of serious damage to health by prolonged exposure through inhalation. Possible risk of harm to the unborn child. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness.  
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing and gloves. If swallowed, seek medical advice immediately and show this container or label. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.  
US Statements: Target organ(s): Liver. Kidneys. Calif. Prop. 65 developmental hazard.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: Yes  
DEMINIMIS: 1 %  
NOTES: This product is subject to SARA section 313 reporting requirements.  
TSCA INVENTORY ITEM: Yes

UNITED STATES - STATE REGULATORY INFORMATION

CALIFORNIA PROP - 65

California Prop - 65: This product is or contains chemical(s) known to the state of California to cause developmental toxicity. This product is or contains chemical(s) known to the state of California to cause developmental toxicity.

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes

NDSL: No

---

Section 16 - Other Information

---

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2006 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.



# Material Safety Data Sheet

Date of Issue: 5/1/08

## 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Name:** Crystal Plus 70-T  
 Crystal Plus TW 100  
**Synonyms:** Technical White Mineral Oil

**Chemical Family:** Petroleum Hydrocarbon  
**Responsible Party:**

STE Oil Company, Inc.  
 2001 Clovis Barker  
 San Marcos, TX 78666  
 800-967-1931

### Emergency Overview

#### 24 Hour Emergency Telephone Numbers:

Spill, Leak, Fire or Accident Call CHEMTREC:

North America: (800) 424-9300

Others: (703) 527-3887 (collect)

California Poison Control System: (800) 356-3129

**Health Hazards/Precautionary Measures:** Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.

**Physical Hazards/Precautionary Measures:** Keep away from all sources of ignition.

**Appearance:** Clear and bright, Water-white

**Physical Form:** Liquid

**Odor:** None

### NFPA 704 Hazard Class

**Health:** 0 **Flammability:** 1 **Instability:** 0 **Legend:** 0 (Least), 1 (Slight), 2 (Moderate), 3 (High), 4 (Extreme)

## 2. COMPOSITION / INFORMATION ON INGREDIENTS

Non-Hazardous Components					
Component	Concentration (wt%)	ACGIH	OSHA	NIOSH	Other:
White Mineral Oil 8042-47-5	100	5 mg/m TWA 10 mg/m STEL	5 mg/m	2500 mg/m IDLH	As Oil Mist, if generated  5 mg/m NOHSC TWA

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

1%=10,000 PPM.

NE=Not Established

## 3. HAZARD IDENTIFICATION

### Potential Health Effects

**Eye:** Contact may cause mild eye irritation including stinging, watering, and redness.

**Skin:** Contact may cause mild skin irritation including redness, and a burning sensation. Prolonged or repeated contact can worsen irritation by causing drying and cracking of the skin leading to dermatitis (inflammation). Not acutely toxic by skin absorption, but prolonged or repeated skin contact may be harmful (see Section 11).

**Inhalation (Breathing):** No information available. Studies by other exposure routes suggest a low degree of toxicity by inhalation.

**Ingestion (Swallowing):** No harmful effects reported from ingestion.

**Signs and Symptoms:** Effects of overexposure may include irritation of the digestive tract, irritation of the respiratory tract, nausea and diarrhea.

**Cancer:** There is inadequate information to evaluate the cancer hazard of this material. See Section 11 for information on the individual components, if any.

**Target Organs:** Inadequate evidence available for this material. See Section 11 for target-organ toxicity information of individual components, if any.

**Developmental:** No data available for this material.

**Pre-Existing Medical Conditions:** Conditions aggravated by exposure may include skin disorders.

#### 4. FIRST AID MEASURES

**Eye:** If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

**Skin:** Wipe material from skin and remove contaminated shoes and clothing. Cleanse affected area(s) thoroughly by washing with mild soap and water and, if necessary, a waterless skin cleanser. If irritation or redness develops and persists, seek medical attention.

**Inhalation (Breathing):** If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

**Ingestion (Swallowing):** First aid is not normally required; however, if swallowed and symptoms develop, seek medical attention.

#### 5. FIRE-FIGHTING MEASURES

##### Flammable Properties:

<b>Flash Point:</b>	>340F
<b>Test Method:</b>	Cleveland Open Cup (COC), ASTM D92
<b>OSHA Flammability Class:</b>	Not applicable
<b>LEL (vol % in air):</b>	No data
<b>UEL (vol % in air):</b>	No data
<b>Auto-Ignition Temperature:</b>	No data

**Unusual Fire & Explosion Hazards:** This material may burn, but will not ignite readily. If container is not properly cooled, it can rupture in the heat of a fire.

**Extinguishing Media:** Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

**Fire Fighting Instructions:** For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8). Isolate immediate hazard area, keep unauthorized personnel out. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk.

#### 6. ACCIDENTAL RELEASE MEASURES

This material may burn, but will not ignite readily. Keep all sources of ignition away from spill/release.

Stay upwind and away from spill/release. Notify persons downwind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8).

Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Spilled material may be absorbed into an appropriate absorbent material. Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of

any spill is recommended. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

## 7. HANDLING AND STORAGE

**Handling:** Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Do not wear contaminated clothing or shoes. Use good personal hygiene practices.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum re-conditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

**Storage:** Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat and all sources of ignition. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Engineering controls:** If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits (see Section 2), additional engineering controls may be required.

**Personal Protective Equipment (PPE):**

**Respiratory:** A NIOSH certified air purifying respirator with a Type 95 (R or P) particulate filter may be used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2).

Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a NIOSH approved self-contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode if there is potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

**Skin:** The use of gloves impervious to the specific material handled is advised to prevent skin contact and possible irritation (see manufacturers literature for information on permeability).

**Eye/Face:** Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

**Other Protective Equipment:** A source of clean water should be available in the work area for flushing eyes and skin.

Impervious clothing should be worn as needed.

Suggestions for the use of specific protective materials are based on readily available published data. Users should check with specific manufacturers to confirm the performance of their products.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Note:** Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm).

<b>Appearance:</b>	Clear and bright, Water-white
<b>Physical Form:</b>	Liquid
<b>Odor:</b>	Mild petroleum
<b>Odor Threshold:</b>	No data
<b>pH:</b>	Not applicable
<b>Vapor Pressure (mm Hg):</b>	<1
<b>Vapor Density (air=1):</b>	>1
<b>Boiling Point/Range:</b>	No data
<b>Melting/Freezing Point:</b>	No data
<b>Solubility in Water:</b>	Insoluble
<b>Partition Coefficient (n-octanol/water) (Kow):</b>	No data
<b>Specific Gravity:</b>	0.82 – 0.88
<b>Viscosity:</b>	72 SUS@ 100F
<b>Percent Volatile:</b>	Nil
<b>Evaporation Rate (nBuAc=1):</b>	Nil
<b>Flash Point:</b>	>340F

<b>Test Method:</b>	Cleveland Open Cup (COC), ASTM D92
<b>LEL (vol % in air):</b>	No data
<b>UEL (vol % in air):</b>	No data
<b>Autoignition Temperature:</b>	No data
<b>Decomposition Temperature:</b>	No data

## 10. STABILITY AND REACTIVITY

**Stability:** Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

**Conditions to Avoid:** Extended exposure to high temperatures can cause decomposition.

**Materials to Avoid (Incompatible Materials):** Avoid contact with strong oxidizing agents.

**Hazardous Decomposition Products:** Combustion can yield carbon, nitrogen, sulfur, phosphorus, and zinc oxides.

**Hazardous Polymerization:** Will not occur.

## 11. TOXICOLOGICAL INFORMATION

### Chronic Data:

The petroleum base oils contained in this product have been highly refined by a variety of processes including severe hydrocracking/hydroprocessing to reduce aromatics and improve performance characteristics. All of the oils meet the IP-348 criteria of less than 3 percent PAH's and are not considered carcinogens by NTP, IARC, or OSHA.

**Target Organ:** Administration of certain mineral hydrocarbon white oils in the diet to Fischer 344 rats at 1500 mg/kg/day for 90 days resulted in the formation of microgranulomas in the liver. However, this response was not observed in studies conducted with other rat strains or dogs. Microgranulomas like those observed in the Fischer 344 rat studies have not been observed in humans.

## 12. ECOLOGICAL INFORMATION

Lubricant oil basestocks are complex mixtures of hydrocarbons (primarily branched chain alkanes and cycloalkanes) ranging in carbon number from C15 to C50. The aromatic hydrocarbon content of these mixtures varies with the severity of the refining process. White oils have negligible levels of aromatic hydrocarbons, whereas significant proportions are found in unrefined basestocks. Olefins are found only at very low concentrations. Volatilization is not significant after release of lubricating oil basestocks to the environment due to the very low vapor pressure of the hydrocarbon constituents. In water, lubricating oil basestocks will float and will spread at a rate that is viscosity dependent. Water solubilities are very low and dispersion occurs mainly from water movement with adsorption by sediment being the major fate process. In soil, lubricating oil basestocks show little mobility and adsorption is the predominant physical process.

Both acute and chronic ecotoxicity studies have been conducted on lubricant base oils. Results indicate that the acute aquatic toxicities to fish, *Daphnia*, *Ceriodaphnia* and algal species are above 1000 mg/l using either water accommodated fractions or oil in water dispersions. Since lubricant base oils mainly contain hydrocarbons having Carbon numbers in the range C15 to C50, it is predicted that acute toxicity would not be observed with these substances due to low water solubility. Results from chronic toxicity tests show that the no observed effect level (NOEL) usually exceeds 1000 mg/l for lubricant base oils with the overall weight of experimental evidence leading to the conclusion that lubricant base oils do not cause chronic toxicity to fish and invertebrates.

Large volumes spills of lubricant base oils into water will produce a layer of undissolved oil on the water surface that will cause direct physical fouling of organisms and may interfere with surface air exchange resulting in lower levels of dissolved oxygen. Petroleum products have also been associated with causing taint in fish even when the latter are caught in lightly contaminated environments. Highly refined base oils sprayed onto the surface of eggs will result in a failure to hatch.

Extensive experience from laboratory and field trials in a wide range of crops has confirmed that little or no damage is produced as a result of either aerosol exposure or direct application of oil emulsion to the leaves of crop plants. Base oils incorporated into soil have resulted in little or no adverse effects on seed germination and plant growth at contamination rates up to 4%.

## 13. DISPOSAL CONSIDERATIONS

This material under most intended uses would become used oil due to contamination by physical or chemical impurities. RECYCLE ALL USED OIL. While being recycled, used oil is regulated by 40 CFR 279. Use resulting in chemical or physical change or contamination may also subject it to regulation as hazardous waste. Under federal regulations, used oil is a solid waste managed under 40 CFR 279. However, in California, used oil is managed as hazardous waste until tested to show it is not hazardous. Consult state and local regulations regarding the proper handling of used oil. In the case of used oil, the intent to discard it may cause the used oil to be regulated as hazardous waste.

Contents should be completely used and containers emptied prior to discard. Rinsate may be considered a RCRA hazardous waste and must be disposed of with care and in compliance with federal, state and local regulations.

Large empty containers, such as drums, should be returned to the distributor or a drum re-conditioner. To assure proper disposal of small empty containers, consult with state and local regulations and disposal authorities.

## 14. TRANSPORTATION INFORMATION

### U.S. Department of Transportation (DOT)

Shipping Description: Not regulated

Note: Material is unregulated unless shipped by land in a packaging having a capacity of 3,500 gallons or more. Then the provisions of 49 CFR, Part 130 apply.

### International Maritime Dangerous Goods (IMDG)

Shipping Description: Not regulated

### International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)

Shipping Description: Not regulated

## 15. REGULATORY INFORMATION

### U.S. Regulations:

CERCLA/SARA - Section 311/312 (Title III Hazard Categories)

Acute Health: No

Chronic Health: No

Fire Hazard: No

Pressure Hazard: No

Reactive Hazard: No

CERCLA/SARA - Section 313 and 40 CFR 372:

This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:

—None Known—

EPA (CERCLA) Reportable Quantity (In pounds):

—None Known—

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (In pounds):

This material contains the following chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372:

—None Known—

California Proposition 65:

Warning: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

—None Known—

### Carcinogen Identification:

This material has not been identified as a carcinogen by NTP, IARC, or OSHA. See Section 11 for carcinogenicity information of individual components, if any.

### TSCA:

All components are listed on the TSCA inventory.

### International Regulations:

Canadian Regulations: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

Domestic Substances List: Listed

### WHMIS Hazard Class:

Not Regulated

### International Inventories:

This material is listed on the following inventories:

Australia (AICS)

Canada (DSL)

China

Europe (EINECS)

Korea (Existing and Evaluated Chemical Substances)

Philippines (PICCS)

Japan (ENCS)

## 16. OTHER INFORMATION

### Disclaimer of Expressed and Implied Warranties:

The information presented in this Material Safety Data Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED



REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license



## MATERIAL SAFETY DATA SHEET

### 1. CHEMICAL PRODUCT AND COMPANY INFORMATION

**Product Name:** RAFFINATE - CHEMICALS

**Manufacturer Information:**

Sunoco, Inc. (R&M)  
Ten Penn Center  
1801 Market Street  
Philadelphia, Pennsylvania, 19103-1699

**Product Use:**

Chemical intermediate

**Emergency Phone Numbers:**

Chemtrec (800) 424-9300  
Sunoco Inc. (800) 964-8861

**Information:**

Product Safety Information (610) 859-1120

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS No.	Amount (Vol%)
2,3-DIMETHYLBUTANE	79-29-8	0 - 20
2-METHYLPENTANE	107-83-5	0 - 20
3-METHYLPENTANE	96-14-0	0 - 15
HEXANE	110-54-3	0 - 15
METHYLCYCLOPENTANE	96-37-7	0 - 10
PENTANE	109-66-0	0 - 8
TOLUENE	108-88-3	0 - 8
ISOPENTANE	78-78-4	0 - 5
2,2-DIMETHYLBUTANE	75-83-2	0 - 5
CYCLOHEXANE	110-82-7	0 - 5
BENZENE	71-43-2	0 - 4
BUTANE	106-97-8	0 - 3
XYLENE	1330-20-7	0 - 2

#### EXPOSURE GUIDELINES (SEE SECTION 15 FOR ADDITIONAL EXPOSURE LIMITS)

	CAS No.	Governing Body	Exposure Limits	
BENZENE	71-43-2	OSHA	C	5 ppm Ceiling
BENZENE	71-43-2	ACGIH	STEL	2.5 ppm
BENZENE	71-43-2	OSHA	STEL	5 ppm
BENZENE	71-43-2	ACGIH	TWA	0.5 ppm
BENZENE	71-43-2	OSHA	TWA	1 ppm
BUTANE	106-97-8	ACGIH	TWA	1000 ppm



CYCLOHEXANE	110-82-7	ACGIH	TWA	100	ppm
CYCLOHEXANE	110-82-7	OSHA	TWA	300	ppm
HEXANE	110-54-3	ACGIH	TWA	50	ppm
HEXANE	110-54-3	OSHA	TWA	500	ppm
ISOPENTANE	78-78-4	Sunoco	STEL	750	ppm
ISOPENTANE	78-78-4	ACGIH	TWA	600	ppm
ISOPENTANE	78-78-4	Sunoco	TWA	600	ppm
PENTANE	109-66-0	ACGIH	TWA	600	ppm
PENTANE	109-66-0	OSHA	TWA	1000	ppm
TOLUENE	108-88-3	OSHA	C	0	ppm
TOLUENE	108-88-3	Sunoco	STEL	150	ppm
TOLUENE	108-88-3	NIOSH	STEL	150	ppm
TOLUENE	108-88-3	ACGIH	TWA	50	ppm
TOLUENE	108-88-3	OSHA	TWA	200	ppm
XYLENE	1330-20-7	ACGIH	STEL	150	ppm
XYLENE	1330-20-7	ACGIH	TWA	100	ppm
XYLENE	1330-20-7	OSHA	TWA	100	ppm

### 3. HAZARDS IDENTIFICATION

#### • EMERGENCY OVERVIEW

Danger! Extremely flammable liquid and vapor. Vapors may cause flash fire or explosion. Harmful if inhaled. May produce nervous system effects, including drowsiness, dizziness, coma and even death. Harmful or fatal if swallowed. Pulmonary aspiration hazard. After ingestion, may enter lungs and produce damage. May cause skin irritation. Contains material or materials that can cause cancer. May cause severe chronic toxicity.

#### Hazards Ratings:

Key: 0 = least, 1 = slight, 2 = moderate, 3 = high, 4 = extreme

	Health	Fire	Reactivity	PPI
NFPA	1	4	0	
HMIS	2	4	0	X

#### • POTENTIAL HEALTH EFFECTS

##### • PRE-EXISTING MEDICAL CONDITIONS

The following diseases or disorders may be aggravated by exposure to this product: Skin; Eye; Blood forming organs; Respiratory system; Lung (asthma-like conditions);

##### • INHALATION

Can cause severe central nervous system depression (including unconsciousness). May cause headaches and dizziness. Repeated excessive exposures may cause blood disorders such as anemia and leukemia. Contains a material that has been related to cancer in humans.

LC50 (mg/l): no data

LC50 (mg/m3): no data

LC50 (ppm): no data

##### • SKIN

May be absorbed through the skin in harmful amounts. Moderately irritating to the skin. Prolonged or repeated contact can result in defatting and drying of the skin which may result in skin irritation and dermatitis (rash).

Draize Skin Score: no data

Out of 8.0

LD50 (mg/kg): no data

##### • EYES

Substance causes slight eye irritation.

##### • INGESTION

Product may be harmful or fatal if swallowed. Pulmonary aspiration hazard. After ingestion, may enter lungs and produce damage. Irritating to mouth, throat, and stomach.

LD50 (g/kg): no data

#### **4. FIRST AID MEASURES**

- **INHALATION**  
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen and continue to monitor. Get immediate medical attention.
- **SKIN**  
Wash with soap and water. Get medical attention if irritation develops or persists. Wash clothing before reuse. Destroy contaminated shoes and other leather products.
- **EYES**  
Flush eye with water for 15 minutes. Get medical attention.
- **INGESTION**  
Do not induce vomiting! Do not give liquids! Get medical attention immediately.

#### **5. FIRE FIGHTING MEASURES**

- **EXTINGUISHING MEDIA**  
Water spray; Regular foam; Dry chemical; Carbon dioxide;
- **FIRE FIGHTING INSTRUCTIONS**  
Use water spray. Use water spray to cool fire exposed tanks and containers. Wear structural fire fighting gear. As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

#### **FLAMMABLE PROPERTIES**

	Typical	Minimum	Maximum	Test Result	Units	Method
Flash Point	-40				F	N/A
Autoignition Temperature	750			Estimated	F	N/A
Lower Explosion Limit	1.5			Estimated	%	N/A
Upper Explosion Limit	7.6			Estimated	%	N/A

#### **6. ACCIDENTAL RELEASE MEASURES**

Prevent ignition, stop leak and ventilate the area. Contain spilled liquid with sand or earth. DO NOT use combustible materials such as sawdust. Vapor can be controlled using a water fog. Water streams should not be directed to the liquid as this will cause the liquid to boil and generate more vapor. Keep personnel upwind from leak. Use appropriate personal protective equipment as stated in Section 8 of this MSDS. Advise the Environmental Protection Agency (EPA) and appropriate state agencies, if required. Absorb spill with inert material (e.g., dry sand or earth), then place in a chemical waste container. Vacuum or sweep up material and place in a disposal container.

#### **7. HANDLING AND STORAGE**

- **HANDLING**  
Use only in a well-ventilated area. Ground and bond containers when transferring material. NFPA class IA storage. Flash point is less than 73 degrees F and boiling point is less than 100 degrees F. Avoid breathing (dust, vapor, mist, gas). Avoid prolonged or repeated contact with skin. Avoid contact with eyes. Wash thoroughly after handling. Never siphon by mouth.
- **STORAGE**  
Keep away from heat, sparks, and flame. Keep container closed when not in use. Consult NFPA and / or OSHA codes for additional information.

#### **8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

Consult With a Health and Safety Professional for Specific Selections

- **ENGINEERING CONTROLS**

Use with adequate ventilation. Ventilation is normally required when handling or using this product to keep exposure to airborne contaminants below the exposure limit. Use explosion-proof ventilation equipment.

- **PERSONAL PROTECTION**

- **EYE PROTECTION**

Use chemical splash goggles and face shield (ANSI Z87.1 or approved equivalent).

- **GLOVES or HAND PROTECTION**

Protective gloves are recommended when prolonged skin contact cannot be avoided. The glove(s) listed below may provide protection against permeation. Gloves of other chemically resistant materials may not provide adequate protection. Neoprene; Nitrile; Polyvinyl alcohol; Viton;

- **RESPIRATORY PROTECTION**

Concentration in air determines the level of respiratory protection needed. Use only NIOSH certified respiratory equipment. Half-mask air purifying respirator with organic vapor cartridges is acceptable for exposures to ten (10) times the exposure limit. Full-face air purifying respirator with organic vapor cartridges is acceptable for exposures to fifty (50) times the exposure limit. Exposure should not exceed the cartridge limit of 1000 ppm. Protection by air purifying respirators is limited. Use a positive pressure-demand full-face supplied air respirator or SCBA for exposures greater than fifty (50) times the exposure limit. If exposure is above the IDLH (Immediately Dangerous to Life and Health) or there is the possibility of an uncontrolled release, or exposure levels are unknown, then use a positive pressure-demand full-face supplied air respirator with escape bottle or SCBA. Wear a NIOSH-approved (or equivalent) full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

- **OTHER**

Where splashing is possible, full chemically resistant protective clothing (e.g., acid suit) and boots are required. The following materials are acceptable for use as protective clothing: Polyvinyl alcohol (PVA); Neoprene; Nitrile; Viton; Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Remove contaminated clothing and wash before reuse. For non-fire emergencies, positive pressure SCBA and structural firefighter's protective clothing will provide only limited protection.

## **9. PHYSICAL AND CHEMICAL PROPERTIES**

Physical Property	Typical	Units	Test Result	Reference
Appearance		N/A	Colorless liq	
Boiling Point		F		
Bulk Density		lb/gal	no data	
Melting Point		F	no data	
Molecular Weight		g/mole	no data	
Octanol/Water Coefficient		N/A	no data	
pH		N/A	no data	
Specific Gravity	0.75	N/A		
Solubility in Water		wt %	Nil	
Odor		N/A	Gasoline	
Odor Threshold	15	ppm	Estimated	
Vapor Pressure	525	mmHg		@ 20 C
Viscosity (F)		SUS	no data	
Viscosity (C)		CsT	no data	
% Volatile	100	wt %		

## **10. STABILITY AND REACTIVITY**

- **STABILITY**  
Stable
- **CONDITIONS TO AVOID**  
Avoid heat, sparks and open flame.
- **INCOMPATIBILITY**  
Strong oxidizers
- **HAZARDOUS DECOMPOSITION PRODUCTS**  
Combustion may produce carbon monoxide, carbon dioxide and other asphyxiants.
- **HAZARDOUS POLYMERIZATION**  
Will not polymerize.

**11. ECOLOGICAL INFORMATION**

No data available

**12. DISPOSAL CONSIDERATIONS**

Follow federal, state and local regulations. This material is a RCRA hazardous waste. Do not flush material to drain or storm sewer. Contract to authorized disposal service.

**13. TRANSPORT INFORMATION**

<u>Governing Body</u>	<u>Mode</u>	<u>Proper Shipping Name</u>
DOT	Ground	Naphtha, solvent

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<u>Governing Body</u>	<u>Mode</u>	<u>Hazard Class</u>	<u>UN/NA No.</u>	<u>Label</u>
DOT	Ground	3 (Flammable liquid)	UN1256	No data available

**14. REGULATORY INFORMATION**

<u>Regulatory List</u>	<u>Component</u>	<u>CAS No.</u>
ACGIH - Occupational Exposure Limits - Carcinogens	BENZENE	71-43-2
ACGIH - Occupational Exposure Limits - Carcinogens	TOLUENE	108-88-3
ACGIH - Occupational Exposure Limits - Carcinogens	XYLENE	1330-20-7
ACGIH - Occupational Exposure Limits - TWAs	BENZENE	71-43-2
ACGIH - Occupational Exposure Limits - TWAs	BUTANE	106-97-8
ACGIH - Occupational Exposure Limits - TWAs	CYCLOHEXANE	110-82-7
ACGIH - Occupational Exposure Limits - TWAs	HEXANE	110-54-3
ACGIH - Occupational Exposure Limits - TWAs	ISOPENTANE	78-78-4
ACGIH - Occupational Exposure Limits - TWAs	PENTANE	109-66-0
ACGIH - Occupational Exposure Limits - TWAs	TOLUENE	108-88-3
ACGIH - Occupational Exposure Limits - TWAs	XYLENE	1330-20-7
ACGIH - Short Term Exposure Limits	BENZENE	71-43-2
ACGIH - Short Term Exposure Limits	XYLENE	1330-20-7
ACGIH - Skin Absorption Designation	BENZENE	71-43-2
ACGIH - Skin Absorption Designation	HEXANE	110-54-3
ACGIH - Skin Absorption Designation	TOLUENE	108-88-3
CAA (Clean Air Act) - HON Rule - Organic HAPs	BENZENE	71-43-2
CAA (Clean Air Act) - HON Rule - Organic HAPs	HEXANE	110-54-3
CAA (Clean Air Act) - HON Rule - Organic HAPs	TOLUENE	108-88-3
CAA (Clean Air Act) - HON Rule - Organic HAPs	XYLENE	1330-20-7
CAA (Clean Air Act) - HON Rule - SOCM Chemicals	BENZENE	71-43-2
CAA (Clean Air Act) - HON Rule - SOCM Chemicals	CYCLOHEXANE	110-82-7
CAA (Clean Air Act) - HON Rule - SOCM Chemicals	HEXANE	110-54-3
CAA (Clean Air Act) - HON Rule - SOCM Chemicals	TOLUENE	108-88-3
CAA (Clean Air Act) - HON Rule - SOCM Chemicals	XYLENE	1330-20-7

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CAA - 1990 Hazardous Air Pollutants  
 CAA - 1990 Hazardous Air Pollutants  
 CAA - 1990 Hazardous Air Pollutants  
 CAA - 1990 Hazardous Air Pollutants  
 California - Prop. 65 - Developmental Toxicity  
 California - Prop. 65 - Developmental Toxicity  
 California - Prop. 65 - Reproductive - Male  
 California - Proposition 65 - Carcinogens List  
 Canada - WHMIS - Ingredient Disclosure  
 Canada - WHMIS - Ingredient Disclosure  
 Canada - WHMIS - Ingredient Disclosure  
 Canada - WHMIS - Ingredient Disclosure  
 Canada - WHMIS - Ingredient Disclosure  
 Canada - WHMIS - Ingredient Disclosure  
 Canada - WHMIS - Ingredient Disclosure  
 Canada - WHMIS - Ingredient Disclosure  
 CERCLA/SARA - Haz Substances and their RQs  
 CERCLA/SARA - Haz Substances and their RQs  
 CERCLA/SARA - Haz Substances and their RQs  
 CERCLA/SARA - Haz Substances and their RQs  
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 CERCLA/SARA - Section 313 - Emission Reporting  
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 CERCLA/SARA - Section 313 - Emission Reporting  
 CWA (Clean Water Act) - Hazardous Substances  
 CWA (Clean Water Act) - Hazardous Substances  
 CWA (Clean Water Act) - Hazardous Substances  
 CWA (Clean Water Act) - Hazardous Substances  
 CWA (Clean Water Act) - Priority Pollutants  
 CWA (Clean Water Act) - Priority Pollutants  
 CWA (Clean Water Act) - Toxic Pollutants  
 CWA (Clean Water Act) - Toxic Pollutants  
 IARC - Group 1 (carcinogenic to humans)  
 IARC - Group 3 (not classifiable)  
 IARC - Group 3 (not classifiable)  
 Inventory - Australia (AICS)  
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 Inventory - Australia (AICS)  
 Inventory - Canada - Domestic Substances List

BENZENE 71-43-2  
 HEXANE 110-54-3  
 TOLUENE 108-88-3  
 XYLENE 1330-20-7  
 BENZENE 71-43-2  
 TOLUENE 108-88-3  
 BENZENE 71-43-2  
 BENZENE 71-43-2  
 2,2-DIMETHYLBUTANE 75-83-2  
 2,3-DIMETHYLBUTANE 79-29-8  
 2-METHYLPENTANE 107-83-5  
 BENZENE 71-43-2  
 BUTANE 106-97-8  
 CYCLOHEXANE 110-82-7  
 HEXANE 110-54-3  
 PENTANE 109-66-0  
 TOLUENE 108-88-3  
 BENZENE 71-43-2  
 BENZENE 71-43-2  
 BENZENE 71-43-2  
 CYCLOHEXANE 110-82-7  
 CYCLOHEXANE 110-82-7  
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 HEXANE 110-54-3  
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 TOLUENE 108-88-3  
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 TOLUENE 108-88-3  
 XYLENE 1330-20-7  
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 XYLENE 1330-20-7  
 2,2-DIMETHYLBUTANE 75-83-2  
 2,3-DIMETHYLBUTANE 79-29-8  
 2-METHYLPENTANE 107-83-5  
 3-METHYLPENTANE 96-14-0  
 BENZENE 71-43-2  
 BUTANE 106-97-8  
 CYCLOHEXANE 110-82-7  
 HEXANE 110-54-3  
 ISOPENTANE 78-78-4  
 METHYLCYCLOPENTANE 96-37-7  
 PENTANE 109-66-0  
 TOLUENE 108-88-3  
 XYLENE 1330-20-7  
 2,2-DIMETHYLBUTANE 75-83-2

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R00000495200, RAFFINATE - CHEMICALS  
 04/21/05

CHEMRISK SUPP 000026

EPI00228



Inventory - Canada - Domestic Substances List  
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2,3-DIMETHYLBUTANE 79-29-8  
 2-METHYLPENTANE 107-83-5  
 3-METHYLPENTANE 96-14-0  
 BENZENE 71-43-2  
 BUTANE 106-97-8  
 CYCLOHEXANE 110-82-7  
 HEXANE 110-54-3  
 ISOPENTANE 78-78-4  
 METHYLCYCLOPENTANE 96-37-7  
 PENTANE 109-66-0  
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 3-METHYLPENTANE 96-14-0  
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 BUTANE 106-97-8  
 CYCLOHEXANE 110-82-7  
 HEXANE 110-54-3  
 ISOPENTANE 78-78-4  
 METHYLCYCLOPENTANE 96-37-7  
 PENTANE 109-66-0  
 TOLUENE 108-88-3  
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 2,2-DIMETHYLBUTANE 75-83-2  
 2,3-DIMETHYLBUTANE 79-29-8  
 2-METHYLPENTANE 107-83-5  
 3-METHYLPENTANE 96-14-0  
 BENZENE 71-43-2  
 BUTANE 106-97-8  
 CYCLOHEXANE 110-82-7  
 HEXANE 110-54-3  
 ISOPENTANE 78-78-4  
 PENTANE 109-66-0  
 TOLUENE 108-88-3  
 XYLENE 1330-20-7  
 2,2-DIMETHYLBUTANE 75-83-2  
 2,3-DIMETHYLBUTANE 79-29-8  
 2-METHYLPENTANE 107-83-5  
 3-METHYLPENTANE 96-14-0  
 BENZENE 71-43-2  
 BUTANE 106-97-8  
 CYCLOHEXANE 110-82-7  
 HEXANE 110-54-3  
 ISOPENTANE 78-78-4  
 METHYLCYCLOPENTANE 96-37-7  
 PENTANE 109-66-0  
 TOLUENE 108-88-3

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R00000495200, RAFFINATE - CHEMICALS  
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CHEMRISK SUPP 000027

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XYLENE	1330-20-7
2,2-DIMETHYLBUTANE	75-83-2
2,3-DIMETHYLBUTANE	79-29-8
2-METHYLPENTANE	107-83-5
3-METHYLPENTANE	96-14-0
BENZENE	71-43-2
BUTANE	106-97-8
CYCLOHEXANE	110-82-7
HEXANE	110-54-3
ISOPENTANE	78-78-4
METHYLCYCLOPENTANE	96-37-7
PENTANE	109-66-0
TOLUENE	108-88-3
XYLENE	1330-20-7
2,2-DIMETHYLBUTANE	75-83-2
2,3-DIMETHYLBUTANE	79-29-8
2-METHYLPENTANE	107-83-5
3-METHYLPENTANE	96-14-0
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BUTANE	106-97-8
CYCLOHEXANE	110-82-7
HEXANE	110-54-3
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METHYLCYCLOPENTANE	96-37-7
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XYLENE	1330-20-7
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2,3-DIMETHYLBUTANE	79-29-8
2-METHYLPENTANE	107-83-5
3-METHYLPENTANE	96-14-0
BENZENE	71-43-2
BUTANE	106-97-8
CYCLOHEXANE	110-82-7
HEXANE	110-54-3
ISOPENTANE	78-78-4
METHYLCYCLOPENTANE	96-37-7
PENTANE	109-66-0
TOLUENE	108-88-3
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2,2-DIMETHYLBUTANE	75-83-2
2,3-DIMETHYLBUTANE	79-29-8
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CYCLOHEXANE	110-82-7
HEXANE	110-54-3
ISOPENTANE	78-78-4
METHYLCYCLOPENTANE	96-37-7
PENTANE	109-66-0
TOLUENE	108-88-3
XYLENE	1330-20-7
BENZENE	71-43-2
BUTANE	106-97-8
CYCLOHEXANE	110-82-7
HEXANE	110-54-3
ISOPENTANE	78-78-4
PENTANE	109-66-0
TOLUENE	108-88-3
XYLENE	1330-20-7
2,2-DIMETHYLBUTANE	75-83-2
2,3-DIMETHYLBUTANE	79-29-8
BENZENE	71-43-2



New Jersey - Special Hazardous Substances	BUTANE	106-97-8
New Jersey - Special Hazardous Substances	CYCLOHEXANE	110-82-7
New Jersey - Special Hazardous Substances	HEXANE	110-54-3
New Jersey - Special Hazardous Substances	ISOPENTANE	78-78-4
New Jersey - Special Hazardous Substances	METHYLCYCLOPENTANE	96-37-7
New Jersey - Special Hazardous Substances	PENTANE	109-66-0
New Jersey - Special Hazardous Substances	TOLUENE	108-88-3
New Jersey - Special Hazardous Substances	XYLENE	1330-20-7
NTP - Report on Carcinogens - Known Carcinogens	BENZENE	71-43-2
OSHA - Final PELs - Ceiling Limits	BENZENE	71-43-2
OSHA - Final PELs - Ceiling Limits	TOLUENE	108-88-3
OSHA - Final PELs - Time Weighted Averages	BENZENE	71-43-2
OSHA - Final PELs - Time Weighted Averages	CYCLOHEXANE	110-82-7
OSHA - Final PELs - Time Weighted Averages	HEXANE	110-54-3
OSHA - Final PELs - Time Weighted Averages	PENTANE	109-66-0
OSHA - Final PELs - Time Weighted Averages	TOLUENE	108-88-3
OSHA - Final PELs - Time Weighted Averages	XYLENE	1330-20-7
OSHA - Regulated Carcinogens	BENZENE	71-43-2
OSHA - Select Carcinogens	BENZENE	71-43-2
Pennsylvania - RTK (Right to Know) List	2,2-DIMETHYLBUTANE	75-83-2
Pennsylvania - RTK (Right to Know) List	2,3-DIMETHYLBUTANE	79-29-8
Pennsylvania - RTK (Right to Know) List	2-METHYLPENTANE	107-83-5
Pennsylvania - RTK (Right to Know) List	3-METHYLPENTANE	96-14-0
Pennsylvania - RTK (Right to Know) List	BENZENE	71-43-2
Pennsylvania - RTK (Right to Know) List	BUTANE	106-97-8
Pennsylvania - RTK (Right to Know) List	CYCLOHEXANE	110-82-7
Pennsylvania - RTK (Right to Know) List	HEXANE	110-54-3
Pennsylvania - RTK (Right to Know) List	ISOPENTANE	78-78-4
Pennsylvania - RTK (Right to Know) List	METHYLCYCLOPENTANE	96-37-7
Pennsylvania - RTK (Right to Know) List	PENTANE	109-66-0
Pennsylvania - RTK (Right to Know) List	TOLUENE	108-88-3
Pennsylvania - RTK (Right to Know) List	XYLENE	1330-20-7
Pennsylvania - RTK - Special Hazardous Substances	BENZENE	71-43-2
TSCA - Sect. 12(b) - Export Notification	CYCLOHEXANE	110-82-7
TSCA - Sect. 12(b) - Export Notification	HEXANE	110-54-3
TSCA - Sect. 12(b) - Export Notification	METHYLCYCLOPENTANE	96-37-7
TSCA - Sect. 12(b) - Export Notification	PENTANE	109-66-0
TSCA - Section 4 - Chemical Test Rules	CYCLOHEXANE	110-82-7
TSCA - Section 4 - Chemical Test Rules	PENTANE	109-66-0
TSCA - Section 8(a) - PAIR Reporting List	PENTANE	109-66-0

**Title III Classifications Sections 311,312:**

- Acute: YES
- Chronic: YES
- Fire: YES
- Reactivity: NO
- Sudden Release of Pressure: NO

**15. OTHER INFORMATION**

Follow all MSDS/label precautions even after container is emptied because it may retain product residue.

# **Support Document 17**

## **Study Protocol**

## **Protocol for the Determination of the Evaporation Rate for Pure Benzene and Benzene as a Component of Liquid Wrench**

### Purpose

The purpose of this evaluation is to measure the evaporation rate of HPLC-grade benzene and the evaporation rate of benzene from a reformulation of the benzene containing version of Liquid Wrench.

### Objectives:

The objectives of this evaluation will be to determine the evaporation rates when:

1. HPLC grade benzene is dispersed onto a flat surface under controlled environmental conditions and the mass-loss rate during evaporation is determined using air sampling instrumentation.
2. A reformulation of the benzene containing version of Liquid Wrench is dispersed onto a flat surface under controlled environmental conditions and the mass-loss rate during evaporation is determined using air sampling instrumentation.
3. A reformulation of the benzene containing version of Liquid Wrench is dispensed onto the surface of a machined metal part under controlled environmental conditions and the mass-loss rate during evaporation is determined using air sampling instrumentation.

### Location and Apparatus

This evaluation will be performed at the Environmental Profiles, Inc. (EPI) corporate facility located in Columbia, Maryland inside a specially constructed room. The room will measure approximately 14' x 18' x 10' and contain approximately 2,500 cubic feet (cu. ft.). It will be constructed from nominal 2" x 4" lumber covered with 6 mil polyethylene sheeting.

Within the room, a glove box-type enclosure measuring approximately 2-feet by 2-feet by 3-feet (2'x2'x3') will be constructed along with an air transport system to deliver and exhaust the air through the chamber that will be chemical resistant. The air transport system must be capable of delivering laminar flow air through the chamber and post chamber. The system shall provide adequate mixing of the vapor in the downstream air where sampling points and viewing windows are located, at least ten duct diameters downstream of any bends or obstructions. Solvent evaporation trials will be performed within the glove-box-type enclosure in order to control for air currents and related environmental factors.

### Glove Box-Type Evaporation Chamber (GBTEC)

- EPI will identify and purchase construction materials that are chemically resistant to absorption or degradation from the testing of benzene and the benzene-containing Liquid Wrench formulations.
- EPI will construct the GBTEC with the appropriate ports and access points to allow for air monitoring, air sampling, photo documentation, and manipulation of materials inside the GBTEC.

**Protocol for the Determination of the Evaporation Rate for Pure Benzene and Benzene as a Component of Liquid Wrench**

- The GBTEC will be ventilated by means of a fan drawing air into the upstream side and exhausting through a duct located downstream of the evaporation chamber.

Equipment and Associated Materials Requirements

The following materials and equipment will be procured for this evaluation:

- One ChemSense 600 ion trap mass spectrometer
- 0, 5 and 250 part per million (ppm) calibration gases
- Summa canisters with a 0.4 liter (L) capacity
- Sampling tube and swedge lock for canisters
- TSI Q-Trak Model 8550 IAQ meter
- VelociCheck thermo-anemometer made by TSI
- Kestrel 4200 Barometric pressure meter
- Calibrated pipettes
- Plate glass with grid sectioned off in one square centimeter squares
- Adjustable platform (glass) to level and hold flat sample plate and plate glass grid in air stream
- Chemical resistant gloves
- Digital and Video Cameras
- Stopwatch
- Sampling and field log forms
- Bulk sample jars
- Coconut charcoal sampling tubes
- Personal sampling pumps
- IR surface temperature reading instrument
- Work pieces and assorted wrenches

Products to be Tested

Two products will be evaluated. HPLC-grade benzene and reformulated benzene containing Liquid Wrench will be used.

- Environmental Profiles, Inc. (EPI) will obtain a sufficient quantity of HPLC grade benzene for use in this evaluation.
- Reformulated Liquid Wrench.
  - EPI will prepare a reformulation of the benzene containing version of Liquid Wrench. The intent is to reproduce, to the extent possible, a reformulated version of Liquid Wrench product L1, which was a benzene-containing raffinate-based product produced from approximately 1960 to 1978.
  - Other constituents may be added to the formulation as needed to closer replicate the historic Liquid Wrench L1 formulation.

**Protocol for the Determination of the Evaporation Rate for Pure Benzene and Benzene as a Component of Liquid Wrench**

- EPI will send a sample of the modified reformulated Liquid Wrench to an AIHA accredited laboratory for Gas Chromatography analysis to determine if the composition of the benzene and other constituents are contained in the appropriate percentage by weight concentrations in the modified reformulated Liquid Wrench.

Testing and Validation of GBTEC

- Establish a laminar air flow through the GBTEC of approximately 25 feet per minute (fpm) and introduce chemical smoke upstream of the glove box section. Visually observe air flow characteristics to verify laminar flow over the flat plate evaporation platform area.
- Dispense 20 ml of test solvent e.g. cyclohexane onto the flat evaporation plate.
- Verify concentration levels across the interior of the downstream duct to verify the solvent vapors are adequately mixed to result in uniform concentrations across the interior of the duct.
- Verify that digital photography will adequately capture the surface area of the solvent on the flat evaporation plate.
- Verify no re-entrainment of volatiles into the GBTEC.
- Test and calibrate all atmospheric monitoring equipment.

Product Testing

**Test Day 1**

- 1) Place plate glass over gridded plate glass inside GBTEC. Verify the plate glass is level using a bubble level.
- 2) Calibrate ChemSense 600 (using calibration gases). Setup data logging interval for approximately one second or less per measurement.
- 3) Establish flow rate of approximately 25 fpm through GBTEC and verify with velometer.
- 4) Conduct cross sectional velometer traverse to determine average air flow through the duct and calculate volumetric flow rate. Conduct a second location velometer traverse to confirm volumetric air flow.
- 5) Setup Q-Trak data logging capability for 60 second intervals and position it near the inlet to the duct system.
- 6) Setup Kestrel data logging capability for 60 second intervals and position it near the inlet to the duct system.
- 7) Setup the personal sampling pump and charcoal tube at the entrance to the duct system set to a flow rate of 0.2 liters per minute (lpm).
- 8) Conduct background sampling for baseline benzene concentration in supplied air using ChemSense 600.
- 9) Insert sampling device probe into chamber and have equipment on standby.
- 10) Dispense 20 ml of pure benzene onto flat evaporation plate (glass) from a 40 ml vial and simultaneously start ChemSense 600. The rate of product application will be timed and should be less than 3 seconds. Leave the vial open with the inside of the cap in the up position after dispensing.

**Protocol for the Determination of the Evaporation Rate for Pure Benzene and Benzene as a Component of Liquid Wrench**

- 11) Summa canister samples of seven second (7 sec.) duration will be taken at  $t =$  one minute and  $t =$  seven minutes.
- 12) Multiple digital photographs of the surface area covered by the benzene will be taken immediately upon dispensing starting at  $t = 0$ . Then photographs will be taken twice per minute until completion of the test.
- 13) Temperature measurements of the glass will be taken prior to dispensing the liquid. After dispensing of the liquid, the temperature of the liquid will be taken. Then the temperature of the liquid will be taken at one minute intervals until the completion of the test.
- 14) Purge GBTEC upon completion of test.
- 15) Clean glass plate with Windex after each test run.
- 16) Repeat Steps 1 – 10 above two more times.
- 17) On test run #2, Summa canister samples of seven second (7 sec.) duration will be taken at  $t =$  two minutes and  $t =$  five minutes.
- 18) Summa canister samples of seven second (7 sec.) duration will be taken at  $t =$  three minutes and  $t =$  six minutes.

**Test Day 2**

- 1) Repeat steps 1 – 16 above except for Step 10.
- 2) In this test from Step 11 above, 20 ml of reformulated Liquid Wrench will be substituted for pure benzene.
- 3) Repeat Steps 1 and 2 above two more times.

**Test Day 3**

- 1) Remove the flat evaporation plate from the glove box and install the plywood with glass plate on top. Insert a dual flanged pipe connector, wrenches, and 40 ml vial containing 20 ml Liquid Wrench.
- 2) Repeat Steps 1 – 8 from Day 1.
- 3) Dispense the Liquid Wrench from the 40 ml vial onto the nuts and bolts on the flange. The rate of product application will be timed and should take around 30 seconds per 4 bolt set.
- 4) Start ChemSense 600 upon first dispensing of Liquid Wrench.
- 5) Summa canister samples of seven second (7 sec.) duration will be taken at  $t =$  one minute and  $t =$  seven minutes.
- 6) Digital photographs of the wetted areas on the work piece will be taken as appropriate but as a minimum, photos shall depict each side of the work piece.
- 7) Purge chamber upon completion of the test.
- 8) Clean up dual flanged pipe connector of any residual oil.
- 9) Repeat Steps 1 – 9 for Test Day 1 two more times except for Step 11. On test run #2, Summa canister samples of seven second (7 sec.) duration will be taken at  $t =$  three minutes and  $t =$  nine minutes. On test run #3, Summa canister samples of seven second (7 sec.) duration will be taken at  $t =$  five minutes and  $t =$  eleven minutes.



**Protocol for the Determination of the Evaporation Rate for Pure Benzene and Benzene as a Component of Liquid Wrench**

Test Methods and Data Collection

- Background (ambient) benzene concentrations will be measured initially using the ChemSense 600. During the test, ambient (supplied air) benzene concentrations will be measured using a personal sampling pump and solid sorbent tube.
- Download the barometric pressure, air temperature, and relative humidity of the test air.
- Summa canister samples will be analyzed by an AIHA accredited laboratory using the EPA Method TO-15 for benzene. Sorbent tubes will be analyzed by an AIHA accredited laboratory using the EPA TO-17 method.
- Download data from the ChemSense 600. Convert the data to a benzene concentration per unit time.
- Compare Summa canister data with ChemSense 600 data for the same sampling interval.
- Convert concentration data to mass loss per unit time data, mg/minute
- Normalize mass loss per unit time data for surface area, mg/minute-cm<sup>2</sup>.

The preceding procedures and test parameters may be subject to change or revision depending on actual environmental conditions observed during testing. Such revisions may include actual sampling times, established air flow rates, solvent quantities or equipment substitutions.

If actual test conditions necessitate major changes to, or a re-evaluation of, the testing protocol, the client will be contacted to discuss recommended modifications to the test procedures.